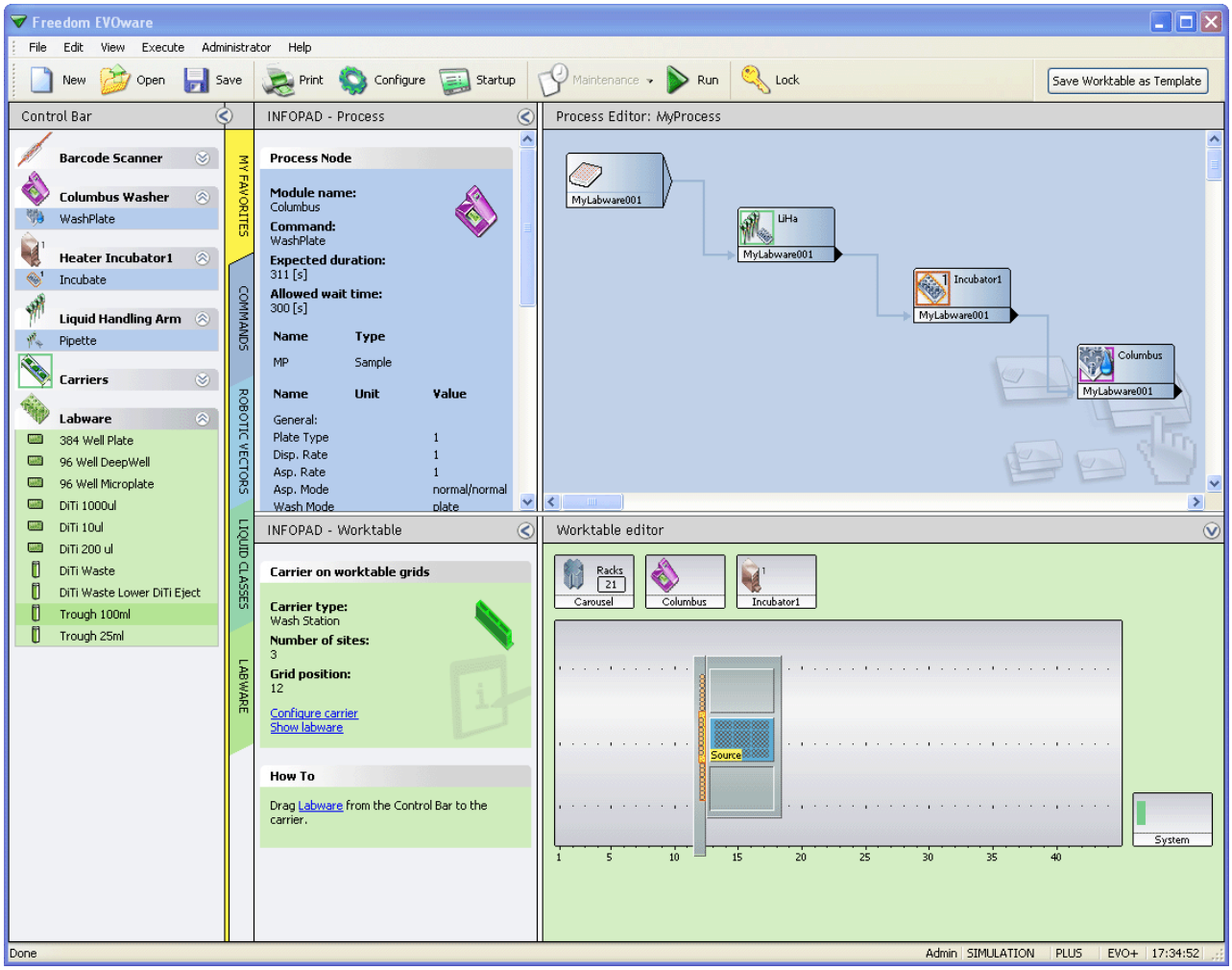
Software Manual

Freedom EVOware® Standard 2.3
Freedom EVOware® Plus 2.3

Extended Device Support (Research Use Only)



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IX Index

1 About This Manual

Purpose of This Chapter

This chapter points out the purpose of the manual, specifies the product the manual deals with and who the manual is intended for. Furthermore, it explains the symbols, conventions and abbreviations used and offers other general information.

Purpose of This Manual

This manual describes the Freedom EVOware software, provides the information required for proper installation, instructs how to run the software and how to make use of all its features.

Target Group

This manual is intended for application specialists who need to develop programs (laboratory processes and/or pipetting programs) for controlling the Freedom EVO series of pipetting instruments. It is assumed that such specialists are already acquainted with standard laboratory procedures for handling and pipetting liquids as described in standard textbooks on this subject.

This manual is also helpful for operators of the Freedom EVO pipetting instrument to give an overview of the wide range of potential applications and instrument options which are available, and to help to understand the function of the processes and/or pipetting scripts which they want to run.

For Your Safety

Please read this manual carefully before installing and running the Freedom EVOware software, in particular Chapter 2, “Safety”.

Scope

This manual applies to Freedom EVOware Standard 2.3 and Freedom EVOware Plus 2.3. For additional information on the Freedom EVOware software, see 3.4 “Supported Pipetting Instruments and Tecan Options”, 3-4.

1.1 Conventions Used in This Manual

The following list provides an overview of the conventions as used throughout this manual:

Names

- **Freedom EVO**: To facilitate reading, the term “pipetting instrument” stands for the Freedom EVO series of pipetting instruments.

User Interface

- **Names of screens** (menus, windows, dialog boxes, message boxes) are printed in italic, e.g.: “The *Select Components* window appears.”
- **Menus and command sequences** are printed in bold type and connected with a **>** sign, e.g., “Start the function with **Options > Te-MO > Wash Unit**.”
- **Names of controls in dialog boxes, windows or message boxes** (command buttons, checkboxes, option buttons etc.) are printed in bold type, e.g. “Select the **Automatic** checkbox.”
- **Directory and file names** are printed as follows:
  - Path and file names are quoted directly, e.g.: C:\Program Files\Tecan\EVOware\database
  - or a placeholder is given for the directory, e.g: <install_path>, which stands for the “real” directory name (the default installation path for Freedom EVOware is C:\Program Files\Tecan\EVOware. Also see the next point.
- **Placeholders** (for file names, numbers dates etc.) are set in angle brackets < >, e.g.: TeSonic_<serial_number>_<date>_<time>.any.
- **Cross references** appear as follows, e.g: “Refer to section 1.1.1, 1-1
  - 1.1.1 refers to the corresponding section number.
  - The symbol denotes the page number.
  - 1-1 stands for the chapter number followed by the page number.

1.2 Reference Documents

This section provides a list of documents which are needed or may be useful in connection with the Freedom EVOware software. They either concern the pipetting instrument itself or the optional devices.

1.2.1 Related Documentation and Software

The following Tecan documentation provides additional information which can be useful when using this manual:

What Does the Doc. ID Tell You?

The Doc. IDs listed below are root numbers. Therefore, they do not contain information about the language, document version or the medium (data storage medium, hardcopy, downloadable file, etc.) of the document.
Check the scope of the corresponding document to make sure that you are in possession of the correct version.

Note: *The Doc. ID does not represent ordering information. For orders refer to the number on the binder, CD casing, etc.*

Operating and Software Manuals

- Freedom EVOware Sample Oriented Add-On (Doc ID 394284 and 394285)
- Freedom EVOware Sample Tracking Add-On (Doc ID 393933)
- Hit-Picking Wizard for Freedom EVOware (Doc ID 395128)
- Normalization Software for Freedom EVOware (Doc ID 394288)
- Freedom EVOware Runtime Controller Manual (Doc ID 394329) [1)]
- PMP Option Application Manual (Doc ID 395390)
- Freedom EVO Operating Manual (Doc ID 392886)
- Carousel Operating Manual (Doc ID 391209)
- Microplate Auto Sealer Operating Manual (Doc ID 391749)
- Te-Flow Operating Manual (Doc ID 391584)
- Te-MagS Operating Manual Doc ID 391237)
- Te-MO Operating Manual (Doc ID 391733)
- Te-MO 384 Multichannel Pipetting Option Operating Manual (Doc ID 391352)
- Te-MO 384 Pipetting Head Operating Manual (Doc ID 391358)
- Te-MO 384 WRS Operating Manual (Doc ID 391768)
- Te-MO 3/3 96 Operating Manual Multi-pipetting Option (Doc ID 392553)
- Te-MO 3/3 384 Operating Manual Multi-pipetting Option (Doc ID 392679)
- Te-MO Active Positioning Carrier Operating Instructions (Doc ID 391864)
- Te-Shake Operating Manual (Doc ID 391496)
- Te-Stack Operating Manual (Doc ID 391862)
- Te-VacS Operating Manual (Doc ID 391236)
- WRC Tower Operating Manual (Doc ID 391865)
- Columbus Washer (Doc ID 30008658)
- 96PW Washer (Doc ID 30001495)
- PW384 Washer (Doc ID 30003394)
- Magellan Data Reduction Software (Doc ID 30001495)
- Magellan Data Reduction Software, two manuals (Doc ID I 117519)

1) *This manual is intended for operators of the pipetting instrument. The same information is also contained in the Freedom EVOware Software Manual.*

- GENios, GENios FL, GENios plus (DocID 1 112904)
- GENios Pro (DocID 1 112935)
- Safire Microplate Reader (Doc ID I 112913)
- SpectraFluor Microplate Reader (Doc ID I 112903)
- SpectraFluor+ Microplate Reader (Doc ID I 112905)
- Sunrise Microplate Reader (Doc ID I 137301 and 1 137302)
- Ultra Evolution Microplate Reader (Doc ID I 112929)
- Cellerity system Operating Manual (DocID 394070)

Firmware Manuals

- PosID-2 Command Set (Doc ID 391141)
- Te-Flow Commands (Doc ID 391845)
- Te-MagS Command Set (DocID 391294)
- Te-VacS Command Set SPE (DocID 3912216)
- Te-Shake ORBI Command Set (DocID 391543)
- Te-Stack Command Set (DocID 392118)

The following Tecan documentation describes the **Setup & Service software**, which is one of the components of the Tecan Instrument Software:

- Instrument Software Manual (Doc ID 392888)

The Setup & Service software is used for calibration, adjustment and commissioning of the pipetting instrument. Setup and service must only be carried out by suitably qualified personnel or by the Tecan Field Service Engineer.

The above manuals can be ordered from your nearest Tecan representative (see 19 “Customer Support”, 19-1).

1.3 Trademarks

The following product names and any registered and unregistered trademarks mentioned in this manual are used for identification purposes only and remain the exclusive property of their respective owners (for simplicity reasons, the symbols for trademarks, such as ® and ™ are not repeated later in the manual):

- Freedom EVOware®, Freedom EVO® and Genesis Freedom® are registered trademarks of Tecan Group Ltd. in major countries.
- Windows® is a registered trademark of Microsoft Corporation.
- Excel® is a registered trademark of Microsoft Corporation.
- Roboflask® is a registered trademark of Corning Inc.

1.4 Abbreviations

See D.1 “Glossary of Terms and Instrument Options”, D-1 for information on common abbreviations. You can also search for abbreviations in the index.

1.5 Context-Sensitive Help System

Freedom EVOware is provided with extensive context-sensitive help (more than 900 pages when printed out). When Freedom EVOware is running, press F1 or click the Help button to get help on the current screen, dialog box or operation you are performing. Some of the dialog boxes do not have a Help button. Press F1 in this case. You can also open the help file with the shortcut in Start > All Programs > Tecan > EVOware.

Note: *The help system contains all of the information which is provided in the Software Manual PDF file on the Freedom EVOware installation CD. It uses the same numbering scheme for chapter headings, figures and tables as the software manual. Help is not provided for standard Windows operations such as Cut and Paste.*

The *Index* tab has the same entries as the index of the printed manual or PDF file.

The *Search* tab (full text search function) lets you use the wild cards ? (one additional character) and * (zero or more additional characters). For example, *scan** finds *scan* and *scanner*. The wild cards can also be used at the beginning of the search string. For example, **allbarcodes* will find the ReadAllBarcodes command.

If you specify more than one search term, they are treated as alternatives (OR function). The search terms are not case sensitive. Use quotes "" to search for strings which contain space characters (e.g. “file names”).

Refer to the standard Microsoft documentation if you need more information on using Microsoft HTML Help.

The Freedom EVOware Software Manual was written using Adobe FrameMaker. The context-sensitive help was created from the FrameMaker files using a special software tool.

Glossary

This manual has an extensive glossary with descriptions of general terms and instrument options (e.g. Te-MagS). The glossary terms are included in the index of the printed manual or PDF file and the Index tab of the online help. They are marked with “overview”, for example “Te-MagS (overview)”.

Freedom EVOware commands

See 13 “Overview of Freedom EVOware Commands”, 13-1 for an overview of the Freedom EVOware commands in the Control Bar. Also see 5.4 “Overview of the Main Window in Freedom EVOware”, 5-9.

2 Safety

Purpose of This Chapter

This chapter covers only the general introductory safety instructions applicable to the Freedom EVOware. Specific safety instructions of the hardware devices are laid down in the respective hardware manuals.

Significance of These Safety Instructions

The Freedom EVOware is a pure software product and as such it does not contain any hazardous parts. However, the software is used to control hardware devices and options, which may contain parts that can move with great force and at considerable speed.

As a consequence, the safety of users and personnel can only be ensured if the safety instructions in this Software Manual as well as the safety instructions of the hardware devices controlled with the software described here are strictly observed and followed.

Therefore, all relevant manuals must always be available to all users working with the Freedom EVOware.

2.1 User Qualification

What Users Must Know

Users must be qualified and trained to run Freedom EVOware.

In particular, they must fulfill the following qualifications:

- They must have a basic knowledge of the Windows operating system.
- They must have read and understood the instructions in this Software Manual.
- Only users that meet the qualifications prescribed here are authorized to run the program described in this Software Manual.

Training Courses

Note: *Tecan recommends that users attend a software training course. Please ask your nearest Tecan representative about the available courses.*

2.2 Warning Notices Used in the Manuals

The symbols used for safety-related notices have the following significance:

WARNING Symbols

WARNING notices appear as follows:

WARNING

Generally, the triangular warning symbol indicates the possibility of personal injury or even loss of life if the instructions are not followed.

ATTENTION Symbols

ATTENTION notes appear as follows:

ATTENTION

With the general “Read This!” symbol, ATTENTIONs indicate the possibility of equipment damage, malfunctions or incorrect process results, if instructions are not followed.

2.3 Use of the Software

Intended Use

The intended use of the Freedom EVOware software is defined in chapter 3.2 “Intended Use of the Freedom EVOware Software”, 🗎 3-3.
The software must not be used for applications other than listed there.

2.4 Specific Hazards

The following hazards are associated with the use of the Freedom EVOware software:

Cellular Phones

If you have a cellular phone

PROHIBITION

Turn off all cellular phones. Do not use or keep them on standby within the laboratory. The use of cellular phones may cause faulty liquid detection and unreliable results.

Electrostatic Discharge

Care must be taken when it is unavoidable to touch delicate electronic circuits.

ATTENTION

Discharge static electricity from your body. Wear a wrist wrap that is connected to ground when handling delicate electronic circuits.

Risks Through Contamination

Always make sure that the instrument is not contaminated chemically, biologically or radioactively.

WARNING

- Chemical, biological and radiative hazards can be associated with certain substances used or processed with the instrument.
- The same applies to waste disposal.
- Always wear appropriate laboratory safety items such as gloves when working on or operating the pipetting instrument.

Always be aware of possible hazards associated with such substances. Request a filled out and signed Decontamination Declaration before performing any setup and test procedures.

Movable Parts

Keep in mind that arm and pipetting devices can move at great speed and with considerable force.

WARNING

- Keep your hands off the zone in which pipetting devices move.
- Never stick your head into the pipetting instrument when the power is switched on.

Laser

Note that barcode readers such as the PosID or Symbol LS-1220 use laser technology for scanning.

WARNING

Laser beam (Laser Class II).
Radiation may be harmful to your eyes.

- Do not stare into beam.
- Always switch instrument off before servicing devices containing a laser source.

2.5 Safety of the Overall System

In addition to the safety instructions in this Software Manual, the safety instructions in the manuals of the hardware devices must also be observed and followed.

WARNING

Hazards originating from the hardware devices controlled with this software.

- Mind the safety instructions of all instruments and options which are used in connection with Freedom EVOware.

2.6 Safety Features of the Pipetting Instrument

The Access/Status feature for the Freedom EVO pipetting instruments consists of up to four electrically-operated doorlocks for safety hoods or safety doors which prevent access to the instrument when it is operating, a status lamp and acoustic alarm device which is mounted above the instrument at a conspicuous position to ensure that it is visible to the operator from some distance away and an electrically-operated pause/resume button to stop and then continue the pipetting script.
The Freedom EVO pipetting instrument is always fitted with two doorlocks. Two additional doorlocks can be fitted to support special hardware arrangements.

Freedom EVOware controls the status lamp and acoustic alarm device as follows:

- Green, red and acoustic alarm are off: Freedom EVOware is idle (not executing a script).
- Green is continuously lit: A script is running and everything is ok.
- Green is flashing: The script has been paused by clicking the *Pause* button or the script command “User prompt” or “Set Variable” with user query is currently waiting for user input.
- Red is flashing and the acoustic alarm is on: An error message is being displayed.

2.6.1 Safe Operation of the Pipetting Instrument and the Doorlocks

Freedom EVOware supports up to four electrically-operated doorlocks for the pipetting instrument and the doorlocks are arranged in groups. The following mechanisms are used to unlock and lock the doorlocks at the appropriate times.

All doorlocks are locked automatically when a pipetting script or process is started. A mechanical interlock ensures that the script or process cannot be started unless the safety hoods are closed and locked. The Doorlock Error is displayed and the script or process will not run if the doorlocks cannot be locked.

The doorlocks are unlocked when the script or process is finished, aborted or paused by clicking the *Pause* button.

The doorlocks are locked again when the script or process is continued after being paused by clicking the *Pause* button.

For safety reasons, it is not possible to unlock the doorlocks when the script or process is running.

For additional information on the operation of the doorlocks see 15.38 “User Prompt Command”, 15-98.

For maximum safety, please observe the following points:

- If you have fitted additional doorlocks, make sure that they are correctly assigned in the Freedom EVOware configuration (see 8.4.2.7 “Doorlocks”, 8-31).
- Above all when the instrument is put into service for the first time, run a test script to check the correct mechanical and electrical function of the doorlocks. Never unplug the electrical connections to the doorlocks.
- If an error message causes the script or process to pause, the doorlocks are unlocked to allow operator intervention.

WARNING

Risk of injury to operating personnel.

- Take extra care when designing the script or process if you have programmed operations which could cause parts of the instrument to move even when the script or process is stopped. Asynchronous movements can be carried out e.g. by stacker devices.

2.7 General Safety Rules

Legal Regulations

Legal regulations, such as local, state and federal laws which prescribe the use or application as well as the handling of dangerous materials in connection with the Freedom EVOware software must be strictly followed.

Modifications

Modifications to the Freedom EVOware software are not permitted. The manufacturer will decline any claim resulting from unauthorized modifications.

2.8 Specific Safety Rules

2.8.1 Unintended or Unexpected Movement of Robot Arms and Other Devices

Safety-relevant situations which can cause unintended or unexpected movement of robot arms and other devices include the following:

- The operator enters an incorrect value in a user prompt.
- The operator enters an incorrect value when teaching a robot movement vector.
- Faulty algorithm in the user application.

Accordingly:

WARNING

Risk of injury to operating personnel.

- Keep your hands off the zone in which pipetting devices move.
- Never stick your head into the pipetting instrument when the power is switched on.
- You must not enter the working area of the pipetting instrument when teaching a robot movement vector.

2.8.2 General Rules When Using the Pipetting Instrument

The following rules must be observed to ensure operator safety, to ensure valid results from the assays or methods and to avoid damage to the equipment:

- All persons working with the pipetting instrument and/or the Freedom EVOware software must be suitably trained. See 2.1 “User Qualification”, 2-1 for more information.
- Users of the pipetting instrument and/or the Freedom EVOware software should be aware of responsibility they carry to ensure that the results obtained are correct and valid. When running Freedom EVOware scripts and processes, users should remain alert and observant at all times to minimize the risk of operator errors and to check for possible equipment malfunctions, e.g. as a result of hardware failures or incorrect set up of the pipetting instrument. See also C “Validation of Freedom EVOware Applications”, C-1.
- If the pipetting instrument will be used with hazardous or contaminating liquids, it is recommended to fit and activate the LICOS option. The LICOS

option is a device which monitors the liquid level in the waste liquid and system liquid containers. It outputs a warning if the waste container is nearly full or if the system liquid container is nearly empty.

- If DITIs are dropped by mistake, the pipetting instrument must be checked for contamination.
- To avoid contamination when DITIs are dropped on purpose (e.g. to pick up new ones), we recommend you to use the Lower DITI Eject option.
- Always wear appropriate laboratory safety items such as gloves when working on or operating the pipetting instrument.
- After setting up the pipetting instrument and installing the Freedom EVOware software, use the Configuration Tool to check that the configured dilutor capacity matches the size of the syringe which is fitted to the pipetting instrument. The syringe size is on a label which is attached to the syringe.
- All scripts and processes must be validated for correct functioning and for correct results before they are used for pipetting with real samples. See 11.4.2.1 “Checking the Pipetting Script for Errors”, 11-5.
- Before running a script or process, you must set up the worktable with the carriers, labware and devices which are needed by the application or assay. The administrator or owner of the pipetting instrument must establish standard operating procedures for setting up the worktable and make them available to everyone who carries out pipetting.
- After setting up the worktable with the carriers, labware and devices which are needed by the application or assay, inspect the paths that the instrument arms (LiHa, RoMa, PnP) will take during the hardware initialization sequence to make sure that there are no obstacles which could obstruct the movements. See also 8.4.2.8 “Arm Initialization”, 8-31.
- Make sure that the RoMa will not interfere with the tubing and syringes at the back of the pipetting instrument during the hardware initialization sequence (the path that the RoMa will take depends to some extent on its initial position, see 9.6.4 “Defining the Home Position for a RoMa”, 9-62).
- When programming movement vectors for the RoMa and/or PnP, inspect the paths to make sure that there are no obstacles which could obstruct the movements when the vector is used; make sure that the RoMa will not interfere with the tubing and syringes at the back of the pipetting instrument.
- Manually initialize the arms of the pipetting instrument (e.g. using the Initialize button in the Freedom EVOware toolbar), make a visual check that the initialization sequence has been carried out correctly and check the log file for initialization errors.
- Only use barcodes with fixed length and check digits for general purpose pipetting applications in a regulated environment. This ensures that incorrectly scanned barcodes are always detected.
- If you are using the PosID-3 for general purpose applications in a regulated environment, you must always activate the Double Blind Entry feature if you intend to enter barcodes manually when they cannot be read.
- When setting up an assay for a liquid which can clot, make sure that clot detection is enabled in the liquid classes which are used to handle the liquid. Refer to the Good Usage information in the Operating Manual for the pipetting instrument for additional recommendations.
- When setting up an assay which uses a trough (container for a reagent liquid), make sure that the liquid classes which are used for aspirating from the trough are configured to immerse the tips in the liquid by at least 3 mm.
- If the system pauses for any reason when running a script or process, the duration of the pipetting script, process step or procedure may differ from the intended time. For example, sample incubation time may be outside of the

specified limits. Depending on the application, this can make the assay invalid.

  – A system pause can be caused e.g. by clicking the Pause button in Freedom EVOware's Runtime Controller dialog box, by pressing the Pause button on the pipetting instrument, by a pipetting error or by an internal timeout if a process step has taken longer than expected or specified.
  – System pauses are not shown in the Gantt chart in the Extended View of the Runtime Controller (the Gantt chart is only available in Freedom EVOware Plus).

- After running a script or process, you must check the log files to make sure that the script or process has completed fully and without errors.
- The results of an assay are only valid if the entire script or process completed without errors. If this is not the case, the entire script or process must repeated after rectifying the cause of the error(s).

3 Product Description

Purpose of This Chapter

This chapter provides a brief overview of the Freedom EVOware software and defines its scope of application. In addition, it describes the features and specifies the PC-requirements for running the software.

3.1 Overview of Freedom EVOware

Freedom EVOware provides a graphical user interface for controlling Tecan's Freedom EVO series of pipetting instruments that facilitates the liquid handling needs of a wide range of life science applications, including both routine and research activities.

The Freedom EVOware software allows the user to develop pipetting programs (which are called *scripts*) and to quickly visualize how a laboratory process or experiment can be implemented. Commands are provided for a wide range of Tecan hardware options and third-party devices and the scripting system is designed for maximum flexibility when developing complex custom processes.

When the script or process is ready, Freedom EVOware controls the pipetting run by sending control signals to the pipetting instrument and optional laboratory devices through a data connection. If operator interaction is necessary, Freedom EVOware can display a dialog box on the display of the workstation which prompts for the information which is needed.

Freedom EVOware has an external programming interface (API) which allows you to integrate Freedom EVOware into third party products or custom applications or to use Freedom EVOware components within other Tecan products running on the same computer or on a different computer in the network.

Freedom EVOware's modular device driver concept allows a wide range of Tecan and third-party devices and options to be supported; a plug-in concept allows new or updated drivers to be easily added to existing Freedom EVOware installations. The Freedom EVOware CD contains drivers for the most commonly used devices. Contact Tecan for information on additional drivers which are available for special applications and third-party hardware.

In addition, the device driver API allows external software specialists to develop and integrate custom device drivers for third party hardware. Furthermore, the modular help system lets you integrate your own HTML Help components within the existing, extensive context-sensitive help system.

Please contact the Tecan software specialists for information on the device driver API and on extending the modular context-sensitive help.

It is instructive for new users of Freedom EVOware to load the example scripts and processes which are provided and to work through each of them by reviewing the on-line help (see 11.4.6 "Example Scripts and Example Process", 🗎 11-7).

In addition, Freedom EVOware's "Infopads" give useful tips for new users (see 5.4.2 "Infopads", 🗎 5-15). Click the hyperlinks in the *How To* section of the Infopad area to run short animations (films) which demonstrate various commonly needed tasks. The animations are stored in AVI format and will be shown e.g. in Windows Media Player.

Also see D.1 "Glossary of Terms and Instrument Options", 🗎 D-1.

This manual instructs the user how to:

- Install the Freedom EVOware software,
- Set up instrument and configuration data,

- Define the pipetting worktable,
- Define the pipetting scheme,
- Set up pipetting scripts and processes,
- Run pipetting scripts and processes.

3.1.1 Freedom EVOware Standard and Freedom EVOware Plus

Freedom EVOware Plus groups pipetting scripts and device commands into processes. This concept makes it possible to optimize the efficiency and thus maximize the throughput of the pipetting instrument through the use of multi-tasking and scheduling. This feature is not available for Freedom EVOware Standard.

In addition, Freedom EVOware Plus allows you to run several processes in parallel. You can run several copies of the same process and/or several different processes in parallel.

The Freedom EVOware installation copies files for both versions of Freedom EVOware to your PC. Activation of the appropriate Freedom EVOware version is done using a hardlock (dongle).

3.1.2 Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus

Freedom EVOware is available with two different feature levels - Freedom EVOware Standard and Freedom EVOware Plus. In addition, a special version is available for the Freedom EVO 75 pipetting instrument. Whereas the software on the Freedom EVOware CD is the same in all cases, the additional features provided by Freedom EVOware Plus are enabled by purchasing and fitting the appropriate hardlock (an intelligent USB plug or “dongle”).

Four different hardlocks are available:

- Freedom EVOware Standard
- Freedom EVOware Standard for Freedom EVO 75
- Freedom EVOware Plus
- Freedom EVOware Plus for Freedom EVO 75

The hardlock version you are currently using is shown in the Freedom EVOware status bar (see 6.7.3 “Status Bar”, 🗎 6-20, *Dongle type*). The Freedom EVOware Plus hardlock also allows you to use Freedom EVOware Standard (but not vice versa).

Note: *Freedom EVOware will run in offline mode if it cannot detect a hardlock when it starts (see 5.1.4 “Instrument and Hardlock Detection”, 🗎 5-3). Firmware commands such as movement commands are not sent to the pipetting instrument in offline mode (i.e. pipetting does not take place).*

It is not necessary to fit a hardlock if you want to run Freedom EVOware in offline mode or if you are using the 3D simulation program EVOSim.

Several software add-ons are available for Freedom EVOware which must be puchased separately. They extend the functionality with special features (see 3.1.3 “Tecan Software Add-ons for Freedom EVOware”, 🗎 3-3). To allow the use of the add-ons, the Freedom EVOware hardlock must be upgraded. This is usually done using an activation tool (software). After purchasing the add-on software, the activation tool is normally sent to you by eMail. The activation tool is

specifically coded for the serial number of your hardlock and will not carry out the upgrade if the serial number does not match.

3.1.3 Tecan Software Add-ons for Freedom EVOware

Several software add-ons are available for Freedom EVOware which extend the functionality with special features. The following add-ons are currently available:

- Freedom EVOware Sample Oriented Add-On
- Freedom EVOware Sample Tracking Add-On
- Hit-Picking Wizard for Freedom EVOware
- Normalization Software for Freedom EVOware

See D “Glossary”, 🗎 D-1 for an overview of these products. See the help files and/or software manuals of these add-ons for full details (see 1.2.1 “Related Documentation and Software”, 🗎 1-3).

3.1.4 3D Simulation Tool for the Pipetting Instrument

The Freedom EVOware setup program lets you install a 3D simulation tool (EVOSim) which can be used to visualize the movements which are carried out by the arms of the Freedom EVO pipetting instrument (LiHa, RoMa, PnP and MCA) when running Freedom EVOware scripts and processes. It can also be used to visualize several other devices such as the Te-MO and the PosID-3.

EVOSim interprets the firmware (hardware) commands which are sent to the pipetting instrument and sends the appropriate responses to Freedom EVOware. To do this, the RS232 connection to the pipetting instrument is configured to communicate with EVOSim instead.

Using an additional tool, EVOSim can also be used to monitor the communication between Freedom EVOware and the pipetting instrument.

For more information, see A.14 “Configuring and Using the 3D Simulation Tool EVOSim”, 🗎 A-103.

3.2 Intended Use of the Freedom EVOware Software

Freedom EVOware 2.3 in this configuration is only intended for scientific or research applications and must not be used for human clinical or diagnostic procedures.

Certain hardware options are only intended for research applications. If you install device drivers which are not part of the general purpose configuration, you will see a warning message during the installation that your Freedom EVOware installation is now only suitable for research applications.

Choose About in the Help menu to get information on the current configuration of your Freedom EVOware installation. Refer to 3.4 “Supported Pipetting Instruments and Tecan Options”, 🗎 3-4 for a list of the options which are supported by the current configuration. Refer to the Getting Started Guide for a list of all of the options which are supported by the Freedom EVOware software.

3.3 What's New in Freedom EVOware 2.3

In addition to a large number of detail improvements, the key new Freedom EVOware features in version 2.3 are as follows:

General & Usability

Support and new commands for the Common Gripper Module (CGM) of the MCA384 pipetting arm (see 15.69, 15-179).

3.4 Supported Pipetting Instruments and Tecan Options

Freedom EVOware 2.3 is intended for the following Tecan pipetting instruments:

- **Freedom EVO 100, 150, 200**
- **Freedom EVO 75**

Freedom EVOware 2.3 in this configuration supports the following optional devices, instrument options and systems:

- Liquid Handling Arm (LiHa) with 2, 4 or 8 tips
- 8 Plus 1 Access option for the Freedom EVO 75 pipetting instrument
- Multi Channel Arm (MCA) with 96 tips.
- Multi Channel Arm 384 (MCA384) with 96 or 384 tips.
- CGM option (Common Gripper Module) for the MCA384
- Tecan Pressure Monitored Pipetting (PMP) option
- XP dilutor
- XLP dilutor
- XMP dilutor (for the Freedom EVO 75 pipetting instrument)
- Standard tips, low volume tips and disposable tips (DITIs)
- Te-PS (Tecan Positioning System) for the Freedom EVO pipetting instrument
- Low Volume Option
- Te-Fill Option
- Lower DITI Tip Eject option
- Robot Manipulator (RoMa), standard and long version
- Pick and Place arm (PnP)
- PosID-2 Barcode Scanner
- PosID-3 Barcode Scanner
- Fast Wash Option (FWO)
- Monitored Pump Option (MPO)
- SPO (Sensored Pump Option)
- Liquid Container Supervisor (LICOS)
- Vacuum Assisted Waste option for viscous liquids
- Te-MO 3/3 and Te-MO 5/3 (Tecan Multi-pipetting Option)
- Te-MO 96-tip pipetting head
- Te-MO 384-tip pipetting head
- Wash & Refill Center for the Te-MO
- 6 or 10 x Te-MO Active Positioning Carriers, depending on Te-MO version (2 solenoids)
- 1 x Te-Stack Labware Stacker for the Te-MO (up to 3 stacks per stacker)

- 4 x Te-Stack Labware Stacker, stand-alone (2 stacks per stacker)
- Te-VacS (Tecan SPE Vacuum Separator)
- Collector plate repositioner and de-salter valve options for the Te-VacS
- Te-MagS (Tecan Magnetic Bead Separator)
- Te-Shake (Orbital Shaker)
- MIO (Monitored Incubator Option) with or without shaking option
- Carousel/Carousel HS with or without barcode scanner
- Carousel NT
- Connection Box for the Te-Flow (In Situ Hybridization) option
- Lauda Waterbath for the Te-Flow (In Situ Hybridization) option (GenePaint chamber racks)
- Symbol LS-1220 Barcode Scanner
- Symbol MS-954 Barcode Scanner
- Hettich Centrifuge
- Te-Link (transfer rail / conveyor system)
- Mettler Balance
- Mettler WM pooling balance (for the Liquid Arrival Check feature)
- 96PW Washer
- PW384 Washer (via WinWash Plus software)
- PW384 Washer (via PW384GP driver)
- Columbus Plate Washer
- REMP Reatrix 2D barcode reader for REMP sample tubes
- REMP PHS Portrait Heat Sealer for microplates
- REMP ACD Automatic Capper Decapper
- Tecan Safety features (4 x doorlocks and pause/resume button)
- Tecan Access/Status feature (status lamp and acoustic alarm device)
- Tecan Magellan data reduction and analysis software for Tecan microplate readers.
- Tecan microplate readers (raw data mode):
  - Sunrise
  - SpectraFluor
  - SpectraFluor+
  - Genios
  - Genios Pro
  - Safire
  - Ultra
  - Ultra Evolution

3.4.1 Supported Combinations of Robot Arms

The Freedom EVO 100, 150 and 200 pipetting instruments can be configured with a maximum of three robot arms on the X slide as follows:

- Up to two liquid handling arms (LiHa)
- One Multi Channel Arm (MCA)
- One Multi Channel Arm 384 (MCA384), optionally fitted with one Common Gripper Module (CGM)
- Up to two plate robot (RoMa) arms
- Up to two tube robot (PnP) arms

The total number of arms of all types is three (e.g. 1 x LiHa and 2 x RoMa or 1 x LiHa, 1 x RoMa and 1 x PnP).

The Freedom EVO 75 pipetting instrument can only be fitted with one liquid handling arm.

3.4.2 Supported Firmware Versions for the Optional Devices

The *Device Information* tab in the *Devices* section of the Configuration Tool lists the device firmware version for which each of the Freedom EVOware device drivers was originally developed. In many cases, the device driver will control the device correctly even if the stated firmware version and the actual firmware version of the device are not identical. See 8.4.1.1 “Device Information Tab”, 🗎 8-21.

Some devices have a firmware command (e.g. Get_Version) which allows you to interrogate their firmware version using the Freedom EVOware Configuration Tool (see 8.4.3.4 “Test Tab”, 🗎 8-37). For descriptions of the pre-configured firmware commands which are available for each device, see the section “Firmware commands” for the device (see 8.5 “Device Driver Configuration”, 🗎 8-39).

3.5 Computer Requirements

The PC on which Freedom EVOware will be installed must meet the following minimum requirements:

Operating System

Freedom EVOware 2.3 is compatible with the following operating system:

- Microsoft Windows XP Professional (Service Pack 3)
- Microsoft Windows Vista

Hardware

- A CPU that is suitable for running Windows XP Professional (recommended minimum specification Pentium 4 or Athlon cpu running at 3 GHz; optimum dual core or multi processor system running at 2.33 GHz).
- RAM size should be suitable for running Windows XP Professional (recommended minimum size 1 GB, optimum 1 GB for Freedom EVOware Standard, 2 GB for Freedom EVOware Plus).
- Virtual memory as required by the operating system.
- An SVGA monitor with 32,768 colors or more and a minimum resolution of 1024x768 pixels (optimum 1280x1024 or higher). To ensure correct display of the dialog boxes, we recommend you to configure your display settings in the Control Panel for *Small Fonts*;
- Mouse.
- CD-ROM drive.
- Hard disk with about 5 GB of unused space for the Freedom EVOware software, optional software components, scripts and log files;
- One serial interface for the data interface to the pipetting instrument (if you intend to connect the pipetting instrument via RS232);
- Additional serial interfaces are required by some of the instrument options (e.g. the Mettler balance);
- A hardlock (dongle) for either Freedom EVOware Standard or Freedom EVOware Plus (a hardlock is a copy protection device which is plugged into the USB port of your PC). See 3.1.2 “Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus”, 🗎 3-2.
- One USB port for the hardlock;
- One USB port for the data interface to the pipetting instrument (if you intend to connect the pipetting instrument via USB);
- Printer (optional).

ATTENTION

Risk of the script or process aborting.

- The PC must be configured to prevent it from going in to Sleep Mode even if no user inputs take place for an extended period of time.
- The USB power management in Windows must be switched off to avoid losing the connection to the pipetting instrument, which may otherwise occur in rare cases. See 4.5.1 “USB Power Management Setting”, 🗎 4-14 for more information.

If you want to connect the pipetting instrument via USB, it should be connected directly to the PC. This also applies to USB connections from hardware options, if they have their own cable. The use of an external USB hub should be avoided. If an external USB hub is absolutely necessary, use an active USB hub (i.e. with its

own power supply). Data transfer problems may occur if you use a passive USB hub, especially if you are also using the PMP option. Please note that some port replicators for laptops contain a USB hub.

Security

The following table shows which permissions are needed for installing and running the Freedom EVOware 2.3 software.

Tab. 3-1 *Minimum Security Permissions*

Activity	**Windows XP Professional**
Program installation	MS Windows Local Administrator
Running the program	MS Windows Power User

Freedom EVOware has four user levels – Administrator, Application Specialist, Power User and Operator. The Freedom EVOware user levels are independent of the MS Windows user levels.

All four Freedom EVOware user levels need read/write access to the Freedom EVOware directory and its subdirectories during program runtime. The Freedom EVOware user level Operator cannot create or modify scripts or processes, but Freedom EVOware still needs read/write access to write log and export files and audit trail data.

4 Installation

Purpose of This Chapter

This chapter describes the installation of the Freedom EVOware software on a target computer. Read it carefully before starting the installation.

4.1 Before You Start

Cross References

List of cross references to information provided in other sections:

Information	References
Supported pipetting instruments and Tecan options	See section 3.4, 3-4
Computer requirements	See section 3.5, 3-7

Target Computers

Freedom EVOware must be installed on target computers that are or will be connected to the pipetting instrument

Other Requirements

The PW384 Plate Washer driver requires the Tecan WinWash Plus software, which must be installed separately. It is normally provided with the washer. WinWash Plus is not necessary for the PW384GP Plate Washer driver.

Drivers for microplate readers (e.g. photometers) require the RdrOLE and XFluor4 software, which must be installed separately. It is normally provided with the reader. Freedom EVOware can also control microplate readers using the Magellan software.

The Magellan driver requires the Tecan Magellan software, which must be installed separately. The Magellan software has built-in drivers for Tecan microplate readers. If you intend to use the Magellan software, it is not necessary to install the driver for your reader when you install Freedom EVOware unless you also want to use the reader in raw data mode.

Note: *You cannot run the FACTS 5.x dynamic scheduling software and Freedom EVOware on the same computer. Please un-install FACTS before you install Freedom EVOware.*

Who Should Install?

The Freedom EVOware software must be installed by a properly trained specialist.

Access Rights

To install Freedom EVOware on the target computer, you need local administrator access rights for the Microsoft Windows XP operating system. Refer to the Microsoft documentation for further information on access rights.

For information on the access rights which are required to use Freedom EVOware, see 3.5 “Computer Requirements”, 3-7, Security.

Saving User Data

If Freedom EVOware is already installed on your PC, before running the installation program we recommend you to back up your Freedom EVOware data files, scripts and processes to exchangeable media or to a network or temporary directory (not within the Freedom EVOware <install_path>). See 8.2 “Backing Up

and Restoring Your Configuration”, 🗎 8-3. You can also use the Export Import tool to save your scripts and processes and other configuration data (see A.9.4 “Export/Import Tool”, 🗎 A-38).

Saving these files is especially recommended in the following cases:

- Before un-installing (removing) the Freedom EVOware software.
- Before installing a newer version of Freedom EVOware.
- Before modifying an existing Freedom EVOware installation.

Saving Audit Trail Data

If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files. These files are located in the <install_path>\AuditTrail directory. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See A.9.6 “Audit Trail Archiving tool”, 🗎 A-47 and B “Appendix B - FDA 21 CFR Part 11 Compliance”, 🗎 B-1.

4.2 Installing Freedom EVOware

Installation Directory

By default, Freedom EVOware will be installed into the <windrive>\Program Files\Tecan\Freedom EVOware directory. <windrive> is the drive in which the Windows operating system is installed.

We recommend you to accept this directory. However, you may install Freedom EVOware into a different drive/directory if you want.

The First Steps

To install Freedom EVOware:

1. Finish all Windows programs that are currently running.
2. Make sure that anti-virus programs (if installed) are not running and that all processes associated with anti-virus programs are stopped. Anti-virus programs can cause the installation of Microsoft .NET Framework and .NET Framework components to fail.
3. Make sure that you are logged in as the local administrator.
4. Insert the installation CD in the computer’s CD-ROM drive.
5. In the Windows Explorer, open your CD-ROM drive and change to the Freedom EVOware\Disk1 directory.

Certain hardware options are only intended for research applications. Refer to “Supported pipetting instruments and Tecan options” in the Getting Started Guide for a list of all of the options which are supported by the Freedom EVOware software.

6. To install Freedom EVOware with the device drivers which are intended for general purpose applications, run **Setup.exe** in the Disk1 directory.
7. To install Freedom EVOware with all available device drivers (including drivers for devices which are only intended for research applications), run **Setup_ro.exe** in the Disk1 directory.
8. The **Welcome** window appears.

EVOware - InstallShield Wizard
Welcome to the InstallShield Wizard for EVOware
The InstallShield(R) Wizard will install EVOware on your computer. To continue, click Next.
Notice: The demo version of EVOware supports Windows 2000 and Windows XP, but the release version supports only Windows XP !!!
WARNING: This program is protected by copyright law and international treaties.
freedom evoware
< Back
Next >
Cancel

Fig. 4-1 *Welcome window*

9 Click **Next** to continue.
You are then shown a window displaying the license agreement.

Note: *The real window may look slightly different from the one shown below.*

License Agreement

EVOware - InstallShield Wizard
License Agreement
Please read the following license agreement carefully.
License Agreement
Note
Carefully read the following terms and conditions. Opening the software package or use of the software contained in the package confirms your acceptance of these terms and conditions and agreement to abide by them. If you do not agree with the terms and conditions of this Agreement, promptly return the package
I accept the terms in the license agreement
I do not accept the terms in the license agreement
InstallShield
< Back
Next >
Cancel

Fig. 4-2 *License Agreement window*

10 Read the license agreement and click **I accept the terms ...** if you are in agreement. Continue with **Next**.

Destination Path

A destination path for the application is suggested in the **Destination Folder** *window.*

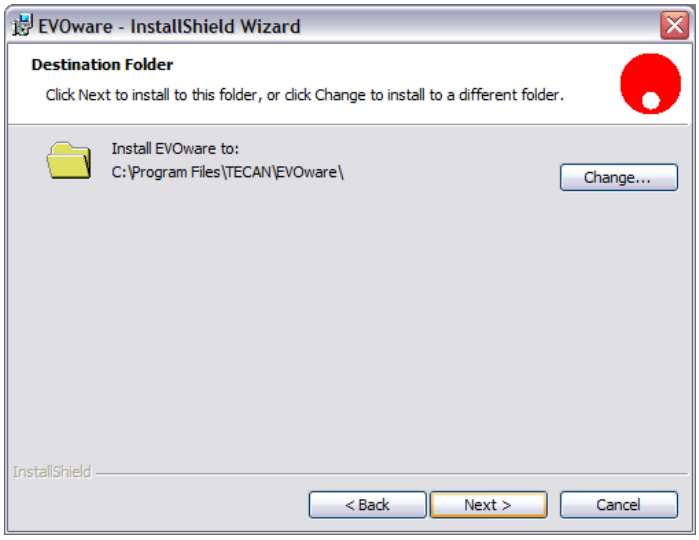


Fig. 4-3 *Destination Folder window*

11 Do one of the following:

- In most cases, you can accept the suggested destination path. Continue with **Next** in this case.
- If necessary, choose a different destination folder with **Change…**. Continue with **Next** when you are ready.

Selecting Components

*The **Custom Setup** window appears.*

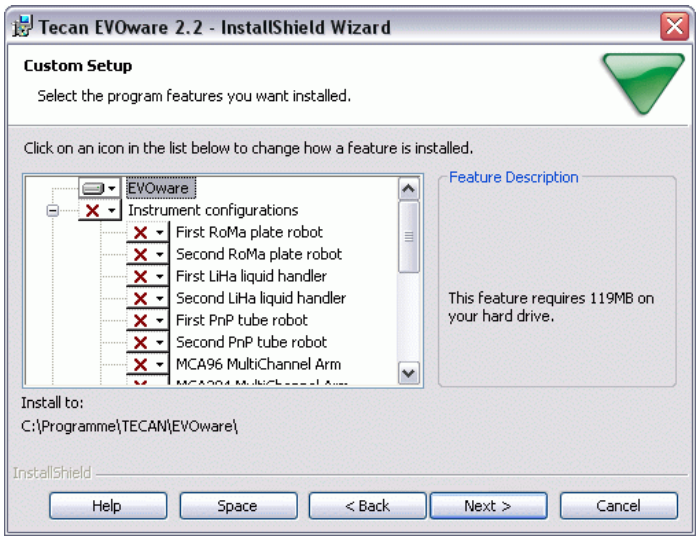


Fig. 4-4 *Custom Setup window*

The choices you will see in the Custom Setup window depend on whether you are installing the general purpose configuration or the research only configuration. Certain Tecan options are only intended for research applications.

The **Custom Setup** window lets you choose the components you wish to install. You can expand the **Instrument Configurations,** the **Devices and Options** and the **Software Options** groups by clicking on the '+' box on the left side. This

shows the individual components in these groups. Click the '-' box if you want to collapse the group again.

When you highlight a group, additional information about the installation of the group is shown in the **Feature Description** panel on the right side of the window.

- The **EVOware** group contains components which are always needed.
- The **Instrument Configurations** group contains the drivers for the robot arms (liquid handling arm, LiHa; plate robots, RoMa; tube robot, PnP; MCA, multi-channel arm; PosID-3, barcode scanner).
- The **Options** group contains drivers for optional hardware such as the Te-Shake orbital shaker and the Te-MagS magnetic bead separator.
- The **Storage Devices** group contains drivers for optional hardware such as the Te-Stack plate stacker and the Carousel.
- The **Incubators** group contains drivers for optional hardware such as the MIO heated incubator.
- The **Washers** group contains drivers for optional hardware such as the PW384 Power Washer.
- The **Readers** group contains drivers for optional hardware such as the Sunrise microplate absorbance reader and the interface driver for the Magellan option.
- The **REMP** group contains drivers for REMP hardware such as the Reatrix 2D barcode scanner for REMP tubes.
- The **3rd Party** group contains drivers for optional hardware from other manufacturers such as the Hettich centrifuge.
- The **Software Options** group contains drivers for software options such as Freedom EVOSim 3D Simulation Tool (see 3.1.4 "3D Simulation Tool for the Pipetting Instrument", 3-3).
- The **Legacy Drivers** group contains drivers for optional legacy hardware which is no longer sold by Tecan, such as the Columbus washer, which is now superseded by other Tecan washers.
- For more information on the optional hardware see 16 "Device Commands", 16-1.

12 Click on each component you want to install and choose **This feature will be installed on local hard drive**:

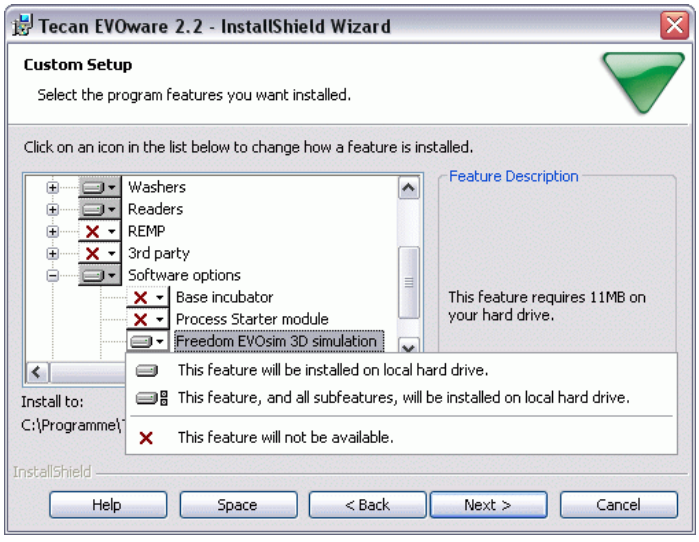


Fig. 4-5 *Selecting components*

You should select the devices and options that are currently available on your pipetting instrument. In the above example, the first plate robot, the liquid handling arm, the tube robot and the Te-Stack have already been selected for installation.

Each pipetting instrument can be configured with a maximum of three robot arms as follows:

- Up to two liquid handling arms (LiHa)
- One Multi Channel Arm (MCA)
- One Multi Channel Arm 384 (MCA384), optionally fitted with one Common Gripper Module (CGM)
- Up to two plate robot (RoMa) arms
- Up to two tube robot (PnP) arms

The total number of arms of all types is three (e.g. 1 x LiHa plus 2 x RoMa or 1 x LiHa plus 1 x RoMa plus 1 x PnP).

The PW384 Plate Washer driver requires the Tecan WinWash Plus software, which must be installed separately. It is normally provided with the washer. WinWash Plus is not necessary for the PW384GP Plate Washer driver.

Drivers for microplate readers (e.g. photometers) require the RdrOLE and XFluor4 software, which must be installed separately. It is normally provided with the reader. Freedom EVOware can also control microplate readers using the Magellan software.

The Magellan driver requires the Tecan Magellan software, which must be installed separately. The Magellan software has built-in drivers for Tecan microplate readers. If you intend to use the Magellan software, it is not necessary to install the driver for your reader when you install Freedom EVOware unless you also want to use the reader in raw data mode.

If necessary, you can run the Freedom EVOware installation program again at a later time and add missing components or remove components you no longer need.

When you highlight a component, additional information about that component is shown in the **Feature Description** panel on the right side of the window.

13 Click **Next** after you have made your choices.

You will then be asked if you want to begin the installation:

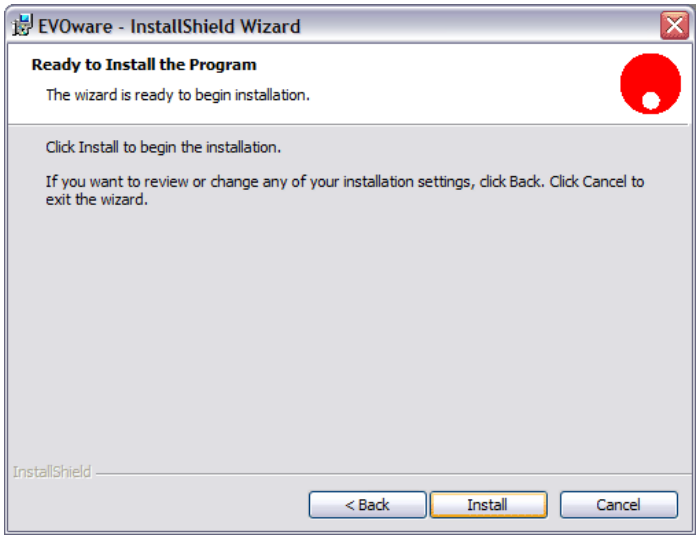

EVOware - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

Fig. 4-6 *Ready to Install window*

Click **Install** if you want to continue.

If you have previously installed Tecan software components on your PC which use the Tecan User Management System (such as Freedom EVOware or the Tecan Magellan software), the Tecan User Management System needs to be updated too and you will be prompted for the name and password of the Administrator acccount.

After entering the name and password, you will be shown the following window:

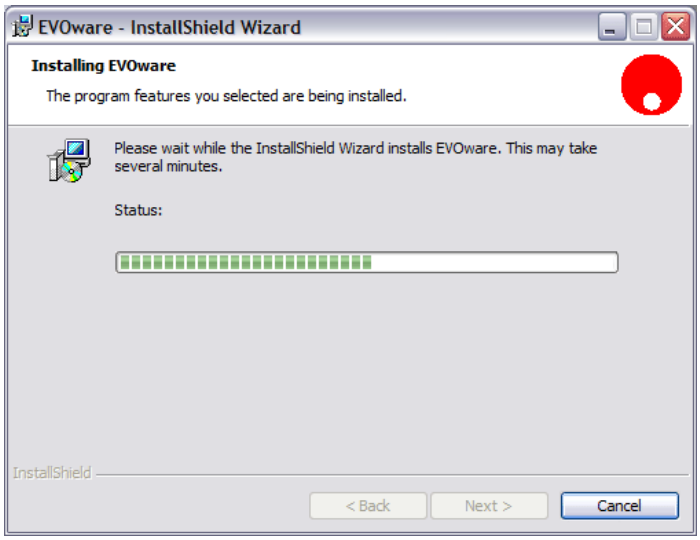

EVOware - InstallShield Wizard
Installing EVOware
The program features you selected are being installed.
Please wait while the InstallShield Wizard installs EVOware. This may take several minutes.
Status:
InstallShield
< Back
Next >
Cancel

Fig. 4-7 *Installing Freedom EVOware window*

Installation Complete

When the installation is finished, the **InstallShield Wizard Completed** window is shown:

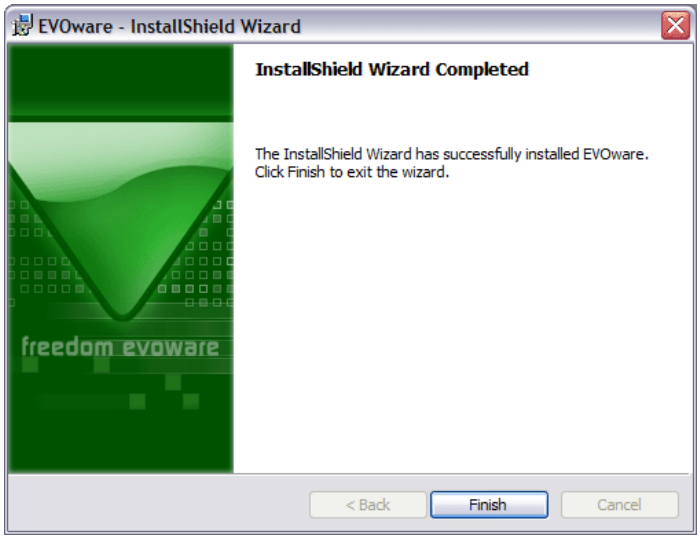


Fig. 4-8 *InstallShield Wizard Completed window*

14 Confirm with **Finish**. The installation of the Freedom EVOware software is now complete.

15 Start Freedom EVOware as the Tecan administrator and carry out the following checks:

- Choose *About* in the *Help* menu and check that you have installed the intended software version (version for general purpose applications or version for scientific research applications with extended device support).
- Check that the correct hardlock (dongle) is fitted to your PC. The hardlock ID number is shown in the About box. If there is no hardlock fitted, “Non upgradable hardlock” is shown. See also 6.7.3 “Status Bar”, 🗎 6-20, *Dongle type*.
- Check that you are running the intended software feature level (Freedom EVOware Standard or Freedom EVOware Plus). This is shown in the status bar and is also dependent on your hardlock (see 6.7.3 “Status Bar”, 🗎 6-20, *Feature level*).

Note: *If you have made a backup copy of configuration and user data from a previous Freedom EVOware installation, you should now use the Restore function to restore it.*

4.3 Modifying, Removing or Repairing Your Installation

If you run the Freedom EVOware installation program when Freedom EVOware is already installed, you are given the options of modifying, removing or repairing the installation.

Note: *You cannot modify, remove or repair Freedom EVOware by choosing* ***Add or Remove Programs*** *in the Windows Control Panel.*

Insert the Freedom EVOware CD and proceed as described in 4.2 “Installing Freedom EVOware”, 🗎 4-2. The installation program automatically detects the software components which you installed previously and will start the Maintenance Program.

After confirming the **Welcome** window by clicking **Next** you are shown the Program Maintenance window:

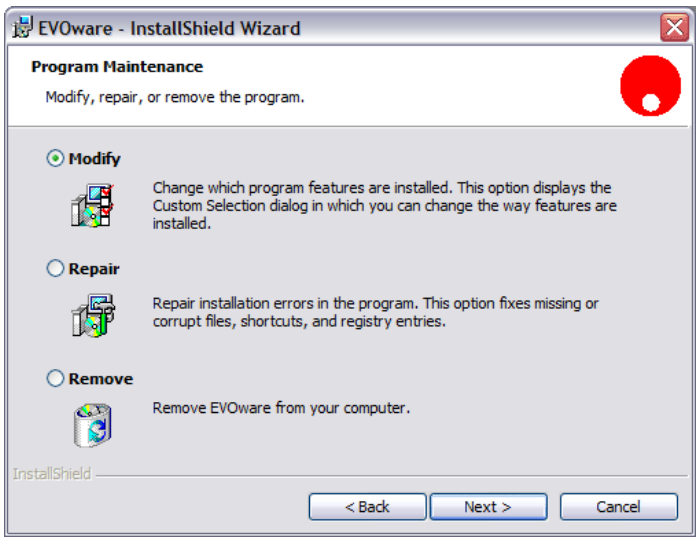

EVOware - InstallShield Wizard
Program Maintenance
Modify, repair, or remove the program.
Modify
Change which program features are installed. This option displays the Custom Selection dialog in which you can change the way features are installed.
Repair
Repair installation errors in the program. This option fixes missing or corrupt files, shortcuts, and registry entries.
Remove
Remove EVOware from your computer.
InstallShield
< Back
Next >
Cancel

Fig. 4-9 *Program Maintenance window*

The three options which are provided are as follows:

- **Modify:** This function allows you to add further software components to the existing Freedom EVOware installation or to remove software components that are no longer needed.
  Certain software components are only intended for research applications. If you use the installation program **Setup_ro.exe** to install options which are not included in the general purpose configuration, you will see a warning message during the installation that your Freedom EVOware installation is now configured for research applications and is no longer intended for general purpose applications.
  If you need to switch back to the general purpose configuration, you must uninstall and then re-install Freedom EVOware.
- **Repair:** This function reinstalls all components of the current software configuration on the target computer. Note that this option does not allow you to add new functions or remove existing functions. Repairing an existing installation may be necessary if the current installation does not run properly (e.g. due to a corrupt file or a file that was deleted unintentionally).
- **Remove:** Completely uninstalls (removes) the Freedom EVOware software from the target computer.

If you choose to un-install Freedom EVOware completely, you will be asked if you also want to delete the user management data. Click *No* if you want to continue using other Tecan software components such as Magellan (or if you plan to re-install Freedom EVOware again). If you click *Yes*, you will have to set up your Tecan users and groups again (see 7 “Tecan User Management System”, 🗎 7-1).

Note: *Before modifying, repairing or removing Freedom EVOware, we recommend you to back up your Freedom EVOware data files, scripts and processes to exchangeable media or to a network or temporary directory (not within the Freedom EVOware <install_path>). See 8.2 “Backing Up and Restoring Your Configuration”, 🗎 8-3.*

Decide What to Do

16 Click the appropriate option button:
   – **Modify** to add or remove components.
   – **Repair** to reinstall the program.
   – **Remove** to uninstall.

17 Click **Next** and continue with your section. You should then follow the instructions which are displayed.

If you choose **Modify**, you can choose the Freedom EVOware components which you want to add or remove (see Fig. 4-5 “Selecting components”, 🗎 4-5). The installation program automatically detects the software components which you installed previously.

Maintenance Complete

When the selected operation is finished, the **InstallShield Wizard Completed** window is shown:

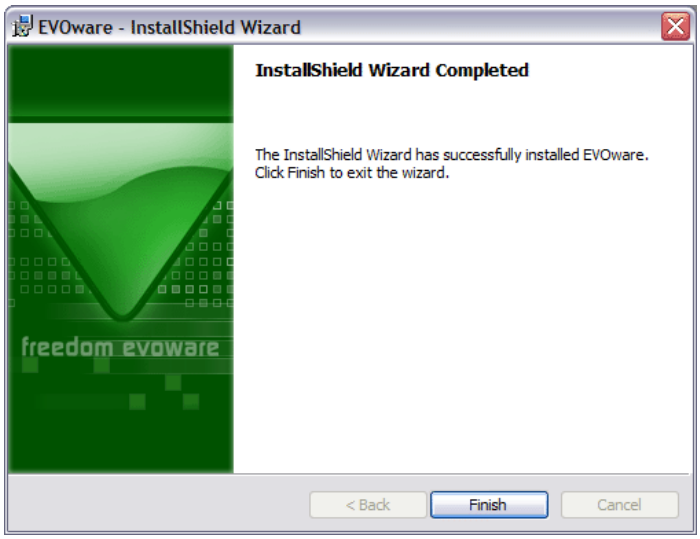


Fig. 4-10 *InstallShield Wizard Completed window for an un-install operation*

18 Click **Finish** to end the installation program.

4.3.1 Upgrading to the Latest Software Version

To upgrade Freedom EVOware to the latest software version, insert the Freedom EVOware CD and proceed as described in 4.2 “Installing Freedom EVOware”, 4-2. The installation program automatically detects the existing installation and will start the upgrade process.

Additional steps which may be required when upgrading are dependent in part on the pipetting instrument and system options which you are already using. For this reason upgrading is normally carried out by a Tecan representative.

Where applicable, please observe your local regulations for re-certification of your pipetting system following a software upgrade.

We recommend you to back up your Freedom EVOware data files, scripts and processes to exchangeable media or to a network or temporary directory before upgrading (see 8.2 “Backing Up and Restoring Your Configuration”, 8-3).

4.3.1.1 Checking the software version which is currently installed

Choose *About* Freedom EVOware in the Help menu if you want to check which version of Freedom EVOware you are currently using. The dialog box shows the Freedom EVOware version, the service pack level and the software build code.

It also shows the intended use of your Freedom EVOware configuration - general purpose applications or research use only. See 3.2 “Intended Use of the Freedom EVOware Software”, 3-3 for more information.

Alternatively, click the Windows Start button and choose Control Panel. Then double-click on *Add or Remove Programs*. Navigate in the list to the entry EVOware and choose *Click here for support information*. You need local administrator access rights for the Microsoft Windows XP operating system to use the Control Panel.

4.3.2 Installation of Service Packs and Hotfixes

Service packs are minor upgrades and/or are used to correct small faults in the Freedom EVOware software. To install a service pack, follow the instructions which are provided.

Note: *Some types of service pack require Freedom EVOware to be re-installed. Other types of service pack do not require Freedom EVOware to be re-installed. You must backup up your system and data files before un-installing Freedom EVOware (see* *8.2 "Backing Up and Restoring Your Configuration", 8-3**). Then use the Restore function after Freedom EVOware has been re-installed.*

Hotfixes are used to correct small faults in the Freedom EVOware software. Hotfixes do not required Freedom EVOware to be re-installed. To install a hotfix, follow the instructions which are provided.

Choose *About Freedom EVOware* in the Help menu if you want to check which version of Freedom EVOware you are currently using. The dialog box shows the Freedom EVOware version, the service pack level and the software build code.

4.4 The Freedom EVOware Hardlock

To use the full functionality of the Freedom EVOware software, you must attach a hardlock (dongle) to a USB port on your PC. Freedom EVOware checks for the presence of the hardlock when it starts and will switch to offline mode if the hardlock cannot be found. See 3.1.2 “Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus”, 3-2.

4.5 Installing the USB driver for the Freedom EVO pipetting instrument

If you want to connect the Freedom EVO pipetting instrument to the PC which is running Freedom EVOware through USB instead of using the serial (RS232) port, you must carry out the following steps to install the USB driver.

The following steps are only necessary when you connect the pipetting instrument to the PC for the first time.

Please install Freedom EVOware before connecting the USB cable.

Switch on the PC, switch on the pipetting instrument and plug in the USB cable. The following dialog box should appear:

Found New Hardware Wizard
Welcome to the Found New Hardware Wizard
Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).
Read our privacy policy
Can Windows connect to Windows Update to search for software?
Yes, this time only
Yes, now and every time I connect a device
No, not this time
Click Next to continue.
< Back
Next >
Cancel

Fig. 4-11 *Installing the USB driver, step 1*

Click *No, not this time* and click *Next*. The following dialog box is shown:

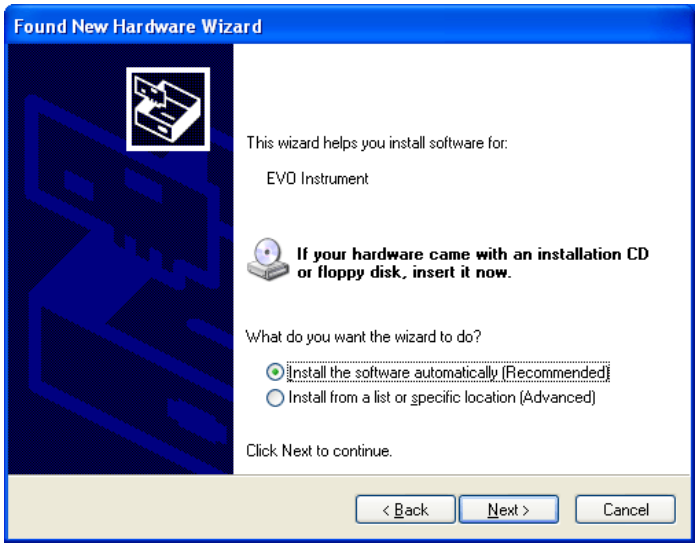

Found New Hardware Wizard
This wizard helps you install software for:
EVO Instrument
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

Fig. 4-12 *Installing the USB driver, step 2*

Click *Install the software automatically (Recommended)* and click *Next*. The following dialog box is shown while the driver is being installed:

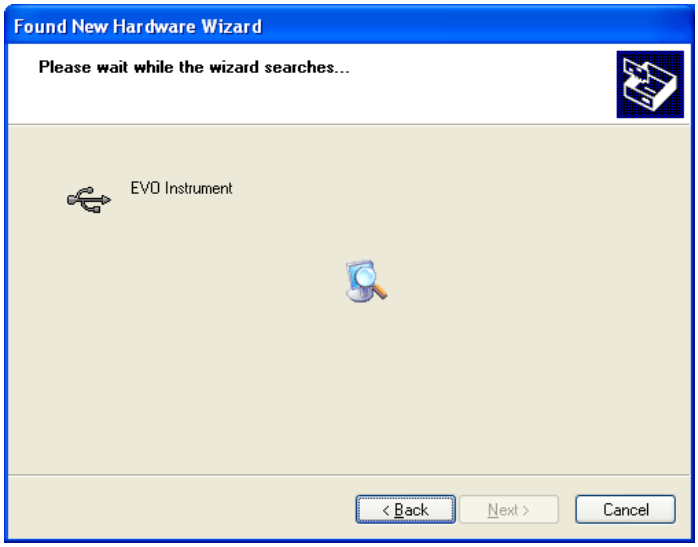


Fig. 4-13 *Installing the USB driver, step 3*

The following dialog box is shown when installation is nearly finished.:

Fig. 4-14 *Installing the USB driver, step 4*

Click *Finish* to complete the installation of the USB driver.
The following figure shows a view of the PC's Device Manager with the USB driver correctly installed (at the bottom of the list).

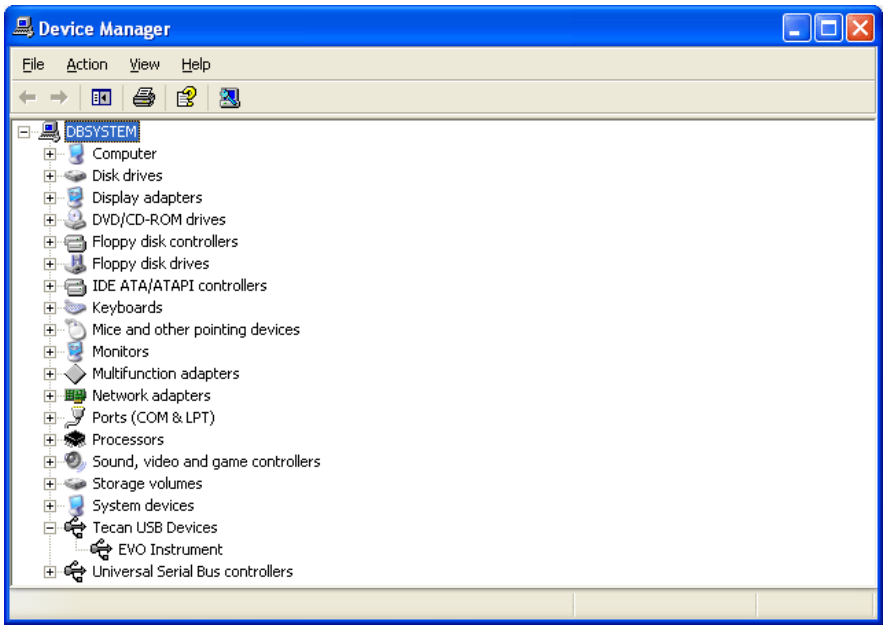


Fig. 4-15 *Device Manager showing the correctly installed USB driver*

4.5.1 USB Power Management Setting

The USB power management in Windows must be switched off to avoid losing the connection to the pipetting instrument, which may otherwise occur in rare cases.

To switch off the USB power management in Windows, choose Start -> Control Panel -> System -> Hardware -> Device Manager -> Universal Serial Bus Controllers -> Power Management tab:

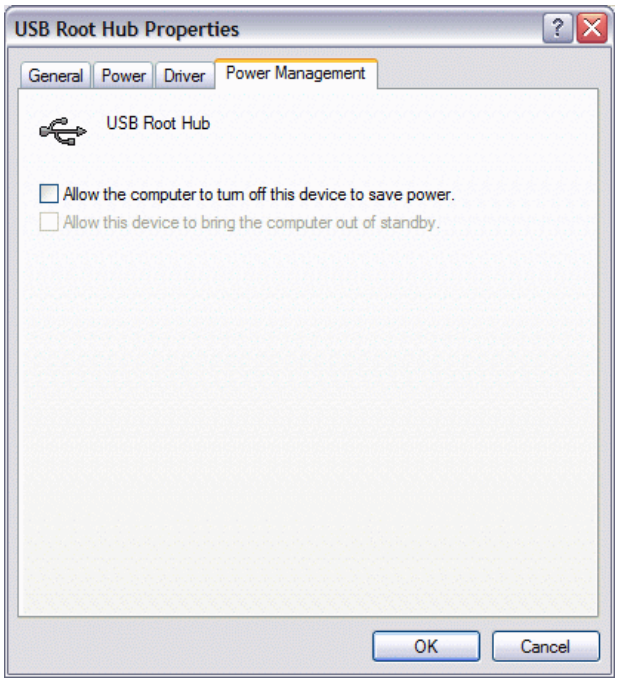


Fig. 4-16 *Device Manager, USB Power Management tab*

4.5.2 USB Hubs

If you want to connect the pipetting instrument via USB, it should be connected directly to the PC. This also applies to USB connections from hardware options, if they have their own cable. The use of an external USB hub should be avoided. If an external USB hub is absolutely necessary, use an active USB hub (i.e. with its own power supply). Data transfer problems may occur if you use a passive USB hub, especially if you are also using the PMP option. Please note that some port replicators for laptops contain a USB hub.

5 Starting Freedom EVOware

This chapter describes how to start Freedom EVOware and gives an overview of the main window.

5.1 Login Screen

To start Freedom EVOware, click the Start button in the Windows Task Bar and choose All Programs > Tecan > EVOware > EVOware Standard or EVOware Plus, depending on which version you want to run.
You will be shown the Login dialog box:

Fig. 5-1 *Login dialog box*

Enter you user name and password for Freedom EVOware and click the large green arrow on the right. Contact your Freedom EVOware Administrator if you do not have a user name and password.

Note: *When Freedom EVOware is started for the first time after installation, you will be prompted to assign a user name and password for the Freedom EVOware Administrator (see 7 "Tecan User Management System", 7-1).*

5.1.1 Loading the device drivers

After clicking the large green arrow you will be shown a progress bar as Freedom EVOware loads all of the software components and device drivers:

Fig. 5-2 *Loading the device drivers*

5.1.2 Driver pre-loading

To ensure that Freedom EVOware starts quickly, above all if you have chosen to install and use a large number of device drivers, the installation program installs a shortcut which automatically loads all of the Tecan drivers each time the PC is started. The drivers remain loaded while the PC is running and it is no longer necessary to load them each time you start Freedom EVOware.

To unload the Tecan drivers when you quit Freedom EVOware, choose *Exit, unload drivers* in the File menu. Alternatively, check the *Unload drivers* checkbox in the Startup Wizard and click *Exit*. Driver pre-loading will be available again when you restart your PC.

Remove the shortcut “EVOware Prelaunch“ from the MS Windows Autostart folder if you do not want the drivers to be loaded each time the PC is started. If you do this, Freedom EVOware will take somewhat longer to start in future.

The driver pre-loading feature can be disabled in the Configuration Tool (see 8.4.1.1 “Device Information Tab”, 8-21).

5.1.3 Driver loading errors

If errors are detected when loading the device drivers, the following dialog box will show status messages:

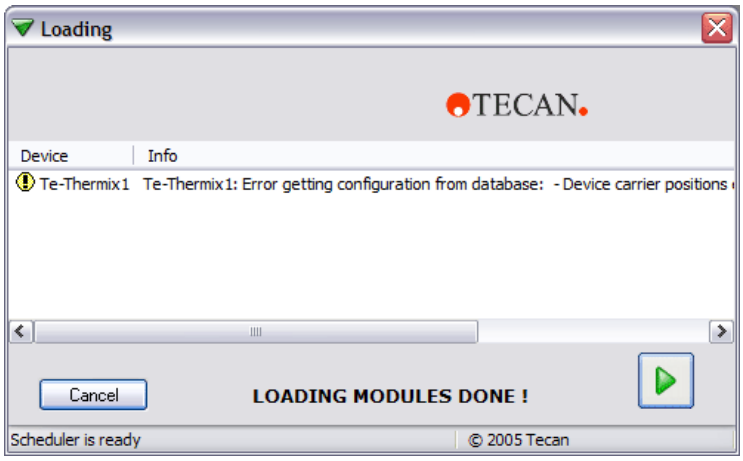


Fig. 5-3 *Loading the device drivers - status messages and warnings*

Use the scroll bar to inspect last column (Info), which explains the reason for the error.

If one of the error messages is shown truncated because it is too long, lengthen the field in the dialog box and activate the horizontal scroll bar by double-clicking on the divider (short vertical line in the header) at the end of the field.

Some of the device drivers will output errors or warnings during loading if Freedom EVOware detects configuration errors.

5.1.4 Instrument and Hardlock Detection

Freedom EVOware will run in offline mode if it cannot detect a hardlock (dongle) when it starts. See 3.1.2 “Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus”, 3-2.

It will also run in offline mode if it cannot detect a pipetting instrument on one of the USB ports or on the configured COM port (it checks the USB ports first).

The following dialog box will be shown if Freedom EVOware cannot communicate with the pipetting instrument:

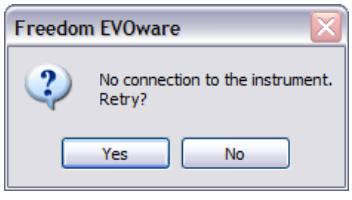


Fig. 5-4 *Starting Freedom EVOware - no pipetting instrument detected*

Click No to continue with offline mode. See also 4.5.1 “USB Power Management Setting”, 4-14 and 4.5.2 “USB Hubs”, 4-15.

In offline mode, firmware commands such as movement commands are not sent to the pipetting instrument (i.e. pipetting does not take place).

Freedom EVOware's current operating mode is shown in the Status Bar (see 6.7.3 "Status Bar", 6-20).

See 8.4.3.3 "Com Ports Tab", 8-36 for information on configuring the pipetting instrument's COM port. The USB ports do not need configuring.

5.2 Startup Wizard, Freedom EVOware Standard

After all of the modules and drivers have been loaded and you have logged in as the Freedom EVOware Administrator or Application Specialist, you will be shown the Freedom EVOware Standard startup wizard.

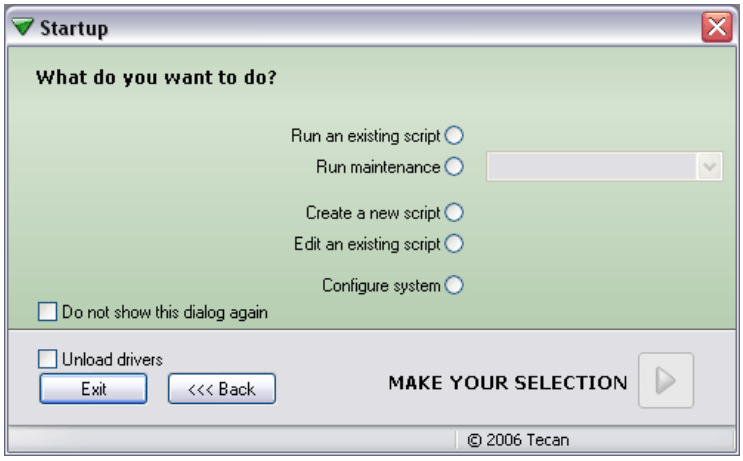


Fig. 5-5 *Freedom EVOware Standard startup wizard*

This dialog box is also shown if you choose Startup Wizard from the File menu.
The options in the Startup Wizard are as follows:

Run an existing script

This option opens the Selection dialog box to allow you to choose the script you want to run. After choosing the script you are shown the Runtime Controller dialog box (see 12.1 “Running a Liquid Handling Script”, 12-1).

Run maintenance

This option is used to run instrument maintenance tasks.

Create a new script

This option opens the Selection dialog box to allow you to choose a template for the new script. The template contains information on e.g. the worktable layout.

Edit an existing script

This option opens the Selection dialog box to allow you to choose the script you want to edit or view. After loading the script, you can also choose to run it.

Configure system

This option is used to configure general settings for the Freedom EVOware software (see 8 “Configuration Tool”, 8-1).

Do not show this dialog again

Check this checkbox if you do not want Freedom EVOware to show the Startup Wizard when it starts next time. In this case, Freedom EVOware Standard will start by opening the Script Editor with the pipetting script which was last used. To deactivate this feature again, open the Startup Wizard by choosing Startup Wizard in the File menu or click the Startup button in the Toolbar and uncheck the checkbox.

Unload drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see 5.1.2 “Driver pre-loading”, 🗎 5-2). Check this checkbox before you click Exit if you want to unload the drivers when you quit Freedom EVOware. The drivers should be unloaded e.g. if Freedom EVOware reports an internal error. The drivers will be loaded again when you re-start Freedom EVOware.

Note: *If you have made configuration changes using the Configuration Tool, the drivers will be unloaded automatically when you quit Freedom EVOware.*

Exit

Quit Freedom EVOware.

5.2.1 Startup Wizard for Freedom EVOware Standard Operators

Operators of Freedom EVOware Standard have less access rights than Administrators or Application Specialists (see 7.2 “Freedom EVOware Access Rights (User Levels)”, 🗎 7-3). Accordingly, they are presented with a startup wizard which has less functions:

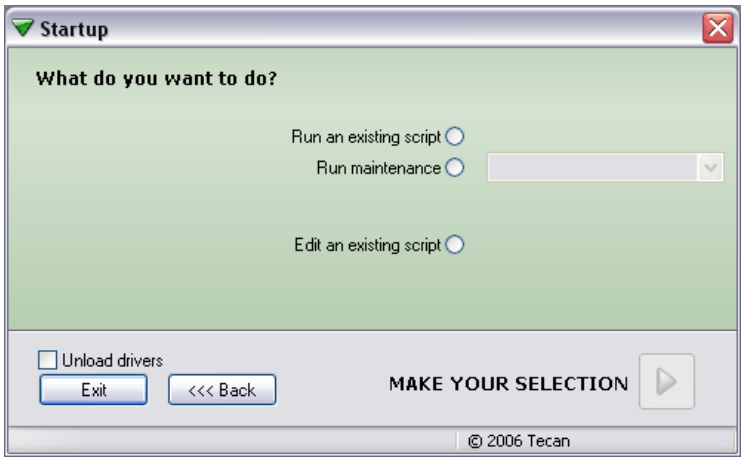


Fig. 5-6 *Freedom EVOware Standard startup wizard for Operators*

See 5.2 “Startup Wizard, Freedom EVOware Standard”, 🗎 5-5 for a description of the functions.

5.3 Startup Wizard, Freedom EVOware Plus

After all of the modules and drivers have been loaded and you have logged in as the Freedom EVOware Administrator or Application Specialist, you will be shown the Freedom EVOware Plus startup wizard.

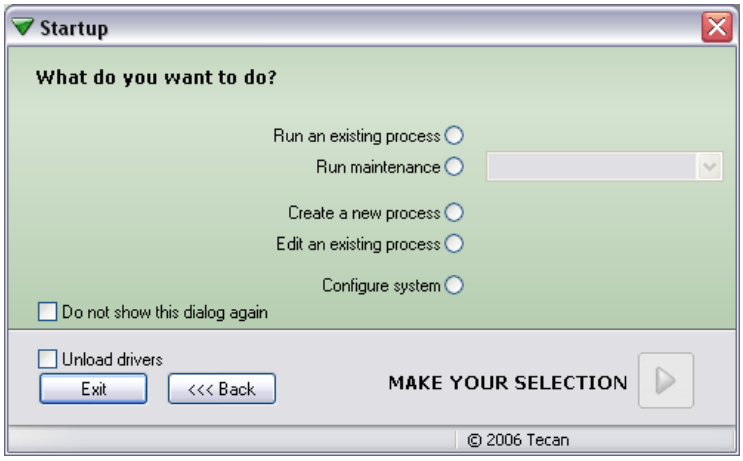


Fig. 5-7 *Freedom EVOware Plus startup wizard*

This dialog box is also shown if you choose Startup Wizard from the File menu.
The options in the Startup Wizard are as follows:

Run an existing process

This option is used run an existing process or method. Click the large green arrow and choose the process or method you want to run in the Selection dialog box which follows. After choosing the process or method, you are shown the Runtime Controller dialog box (see 12.2 “Running and Optimizing a Process (Freedom EVOware Plus)”, 🗎 12-5).

A method is a set of one or more processes to be run together (either sequentially or in parallel). The method file also contains information on the runtime settings. Methods are created and saved in the Runtime Controller.

Run maintenance

This option is used to run instrument maintenance tasks. See 6.4.2 “Run Maintenance”, 🗎 6-10.

Create a new process

This option opens the Selection dialog box to allow you to choose a template for the new process. The template contains information on e.g. the worktable layout.

Edit an existing process

This option opens the Selection dialog box to allow you to choose the process you want to edit or view. After loading the process, you can also choose to run it.

Configure system

This option is used to configure general settings for the Freedom EVOware software (see 8 “Configuration Tool”, 🗎 8-1).

Do not show this dialog again

Check this checkbox if you do not want Freedom EVOware to show the Startup Wizard when it starts next time. In this case, Freedom EVOware Plus will start by opening the Process Editor with the process which was last used. To deactivate this feature again, open the Startup Wizard by choosing Startup Wizard in the File menu or click the Startup button in the Toolbar and uncheck the checkbox.

Unload drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see 5.1.2 “Driver pre-loading”, 🗎 5-2). Check this checkbox before you click Exit if you want to unload the drivers when you quit Freedom EVOware. The drivers should be unloaded e.g. if Freedom EVOware reports an internal error. The drivers will be loaded again when you re-start Freedom EVOware.

Note: *If you have made configuration changes using the Configuration Tool, the drivers will be unloaded automatically when you quit Freedom EVOware.*

Exit

Quit Freedom EVOware.

5.3.1 Startup Wizard for Freedom EVOware Plus Operators

Operators of Freedom EVOware Plus have less access rights than Administrators or Application Specialists (see 7.2 “Freedom EVOware Access Rights (User Levels)”, 🗎 7-3). Accordingly, they are presented with a startup wizard which has less functions:

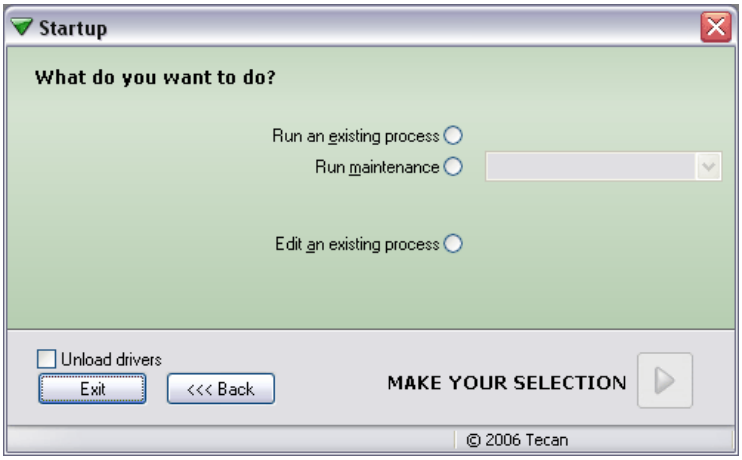


Fig. 5-8 *Freedom EVOware Plus startup wizard for Operators*

See 5.3 “Startup Wizard, Freedom EVOware Plus”, 🗎 5-7 for a description of the functions.

5.4 Overview of the Main Window in Freedom EVOware

The following section describes the key features of the Freedom EVOware main window. See also 6 “Menus”, 6-1 and 13 “Overview of Freedom EVOware Commands”, 13-1.

5.4.1 Control Bar

The Control Bar is the vertical area at the left of the screen. It is used to select the objects and commands which you need to set up your process or script. It is also used to configure the liquid classes for the liquid you want to pipette and to set up robot vectors.

The Control Bar is only visible for the user levels Administrator, Application Specialist and Power User (not for operators).

Six colored tabs can be seen to the right of the Control Bar. Click on the tabs to select the type of object you want to work with. Each of the tabs contains a list of objects which are arranged in groups. For example, the Labware tab contains groups for Microplates, Tips, Wash and Waste, Troughs, Tubes, Miscellaneous and Allowed Labware. Click in the group’s title bar to collapse the group.

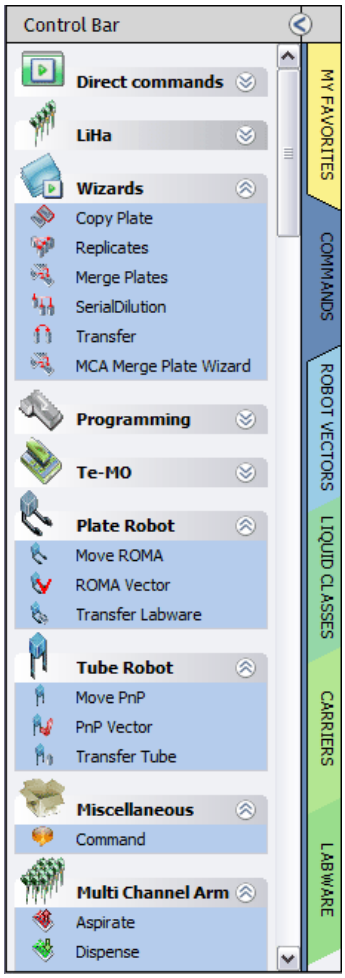


Fig. 5-9 *Control Bar showing the Commands tab*

If necessary, you can resize the Control Bar by dragging the divider to the left of the colored tabs.

5.4.1.1 My Favorites

Click this tab to view your favorite direct commands, device commands, liquid handling commands, robot vectors and labware. The list already contains a few standard items when Freedom EVOware has just been installed. To add a copy of an object from another Control Bar group to My Favorites, right-click the object and choose *Add to favorites* from the context menu. To remove the object again from My Favorites, right-click the object (in the My Favorites section or in the section where the object belongs) and choose *Remove from favorites*.

If you click My Favorites and select a carrier, you will not see an Allowed Labware section (below the Labware section) if none of your favorite labware items are compatible with this carrier. Click the Labware tab instead to see all of the allowed labware for this carrier.

5.4.1.2 Commands

Click this tab to view the available script commands and device commands. The commands are divided into groups (e.g. Liquid Handling Arm commands).

In addition, the Commands tab also contains up to seven direct commands (see 5.4.1.3 “Direct commands”, 🗎 5-10).

In Freedom EVOware Plus, when the Script Editor is open the Commands tab of the Control Bar only shows script commands (commands which are used for writing pipetting scripts, see 13.1 “Overview of Script Commands”, 🗎 13-1). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices, see 13.2 “Overview of Device Commands”, 🗎 13-12).

In Freedom EVOware Standard, the Control Bar always shows both command types (it does not have a Process Editor).

If you cannot find the device that you want to use in the Control Bar, you must run the installation program again and install the respective device driver (see 4.3 “Modifying, Removing or Repairing Your Installation”, 🗎 4-8). Also check whether the driver has been installed but is currently deactivated (see 8.4.1.1 “Device Information Tab”, 🗎 8-21, *Start* checkbox).

5.4.1.3 Direct commands

Direct commands are used for service purposes, e.g. for picking up DITIs or flushing the tips. They provide a convenient alternative to creating and running a pipetting or maintenance script which carries out the same function.

The Control Bar only shows direct commands for devices whose device driver is installed and loaded. For example, the direct command “Load the Te-MO” is only shown in the Control Bar if you have installed and have chosen to load the Te-MO driver. The DITI commands are only shown if the LiHa is configured with DITIs.

To run a direct command, right click on the command and choose Run in the context menu.

Direct commands are only meaningful If you are running Freedom EVOware in real mode and the PC is connected to a pipetting instrument. If Freedom EVOware is running in offline mode, in most cases the dialog box of the direct command will not open when you double-click on the command.

Many of the direct commands have an equivalent script command. In these cases, click the cross-reference link and refer to the script command for a description of the parameters which are required:

- Prime WRC: This direct command is used to prime the wash block of the Te-MO 96, Te-MO 384 or MCA. Choose the required wash block from the pull down list. The list shows all wash blocks which are currently positioned in the Worktable Editor. Then specify the required priming duration and click Start.
- Load the Te-MO: See 15.56.12 “Load the Te-MO Command”, 🗎 15-138.
- Fill Te-MO 384: See 15.56.13 “Fill system (Te-MO 384) Command”, 🗎 15-138.
- Flush: This is used to flush the LiHa. See 15.4 “Wash Tips Command”, 🗎 15-8.
- Prime Te-Fill: See 15.16 “Te-Fill Prime Command”, 🗎 15-26.
- Drop DITIs: See 15.8 “Drop DITIs Command”, 🗎 15-14. Note: Freedom EVOware automatically opens the dialog box for this command if the Runtime Controller encounters a Get DITIs command when tips are already mounted from a previous pipetting operation.
- Set DITI Position: See 15.9 “Set DITI Position Command”, 🗎 15-15.
- Get DITIs: See 15.7 “Get DITIs Command”, 🗎 15-13.
- LiHa Safe Flush: This direct command is used to discard the contents of the LiHa tips to a specified location (typically into a microplate, tube rack, a trough or the wash station waste). If hazardous liquid is left in the tips after completing a script or process, you can use this command to empty the tips for safety reasons. It can also be used to recover the contents of the tips if the script or process was aborted for some reason before it completed.
  If your pipetting instrument is fitted with more than one LiHa, choose the one you want to use and select the labware you want to use by clicking on the labware in the Worktable Editor. Then click on the well(s) you want to use. See 15.2 “Dispense Command”, 🗎 15-3 for information on the other parameters you need to specify (e.g. tip selection).
- Send Firmware Command:
  - **Command**: Specify the firmware command you want to send to the instrument. For example, “A1RPZ0” returns the current Z position of each of the LiHa tips. See the respective instrument manual for a list of firmware commands. Firmware commands are nearly always written uppercase.
  - **Response**: Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. See the respective instrument manual for information on return parameters from firmware commands.
  - **Error Code**: All firmware commands terminate with an error code.The error code is 0 if the command was executed with no errors.

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

5.4.1.4 Direct commands for the MCA96

Direct commands are used for service purposes, e.g. for picking up DITIs or flushing the tips. They provide a convenient alternative to creating and running a pipetting or maintenance script which carries out the same function. For general information on direct commands see 5.4.1.3 “Direct commands”, 🗎 5-10.

- MCA96 Get Tips: This direct command is used to get MCA96 DITIs or tip blocks. See 15.68.5 “MCA96 Get DITIs Command”, 🗎 15-167 and 15.68.7 “MCA96 Get Tip Block Command”, 🗎 15-170.
- MCA96 Drop Tips: This direct command is used to put down MCA96 DITIs or tip blocks. See 15.68.6 “MCA96 Drop DITIs Command”, 🗎 15-168 and 15.68.8 “MCA96 Drop Tip Block Command”, 🗎 15-171.
- MCA96 Safe Flush: This direct command is used to discard the contents of the MCA96 tips to a specified location (typically into a microplate or a trough). If hazardous liquid is left in the tips after completing a script or process, you can use this command to empty the tips for safety reasons. It can also be used to recover the contents of the tips if the script or process was aborted for some reason before it completed.

5.4.1.5 Direct commands for the MCA384 and the CGM

Direct commands are used for service purposes, e.g. for picking up DITIs or flushing the tips. They provide a convenient alternative to creating and running a pipetting or maintenance script which carries out the same function. For general information on direct commands see 5.4.1.3 “Direct commands”, 🗎 5-10.

- MCA384 Get DITIs: See 15.69.8 “MCA384 Get DITIs Command”, 🗎 15-191.
- MCA384 Drop DITIs: See 15.69.9 “MCA384 Drop DITIs Command”, 🗎 15-194.
- MCA384 Get Head Adapter: See 15.69.6 “MCA384 Get Head Adapter Command”, 🗎 15-189.
- MCA384 Drop Head Adapter: See 15.69.7 “MCA384 Drop Head Adapter Command”, 🗎 15-190.
- MCA384 Safe Flush: This direct command is used to discard the contents of the MCA96 tips to a specified location (typically into a microplate or a trough). If hazardous liquid is left in the tips after completing a script or process, you can use this command to empty the tips for safety reasons. It can also be used to recover the contents of the tips if the script or process was aborted for some reason before it completed.
- Dock CGM. This direct command is used to dock the common gripper module of the MCA384. See also 15.69.13 “MCA384 Dock CGM Command”, 🗎 15-204.
- Undock CGM. This direct command is used to undock the common gripper module of the MCA384 and rotate the gripper to a specified angle (in 0.1 degrees steps). See also 15.69.14 “MCA384 Undock CGM Command”, 🗎 15-204.

5.4.1.6 Robot Vectors

Click this tab to view the movement vectors which have been defined for the plate robot, the multi channel arm and the tube robot.

This tab only shows home vectors and vectors which were not assigned to carriers or labware items in the Edit Carrier or Edit Labware dialog boxes.

Plate robot vectors specify movements to be carried out by the RoMa (Robot Manipulator). Current Tecan pipetting instruments can be fitted with up to two RoMas. See 9.6 “Creating and Editing Plate Robot Vectors”, 🗎 9-55.

Multi channel arm vectors specify movements to be carried out by the MCA. Current Tecan pipetting instruments can only be fitted with one MCA. MCA vectors are very similar to RoMa vectors. See 9.8 “Creating and Editing MCA Vectors”, 🗎 9-69.

Tube robot vectors specify movements to be carried out by the PnP (Pick & Place robot). Current Tecan pipetting instruments can be fitted with up to two PnP arms. See 9.7 “Creating and Editing Tube Robot Vectors”, 🗎 9-63.

Home vectors specify the movements to be carried out by the RoMa and/or PnP in order to move the robot back to its home (parking) position. See 9.6.4 “Defining the Home Position for a RoMa”, 🗎 9-62 and 9.7.4 “Defining the Home Position for a PnP”, 🗎 9-69. You cannot and do not need to define a home vector for the multi channel arm.

To create a new plate robot vector, right-click the group heading *Robot Vectors*, choose *New*, enter a descriptive name of your choice and click OK to open the Teach Plate Robot Vector dialog box (see 9.6.2 “Teach Plate Robot Vector Dialog Box”, 🗎 9-59).

If your pipetting instrument is fitted with more than one plate robot, it is recommended to suffix the vector name with “1” or “2”, e.g. “MoveBlock2” to indicate which RoMa was used for teaching (Note: the vector name does not influence which RoMa is used, either in Freedom EVOware Plus or in Freedom EVOware Standard). In Freedom EVOware Standard, user-defined plate robot vectors can be used in Transfer Labware and RoMa Vector commands. See also 17.3 “Site-specific RoMa vectors”, 🗎 17-13.

To create a new tube robot vector, right-click the group heading *Robot Vectors (Tubes)*, choose *New*, enter a descriptive name of your choice and click OK to open the Teach Tube Robot Vector dialog box (see 9.7.2 “Teach Tube Robot Vector Dialog Box”, 🗎 9-65). Use the name “Home1” to create a home vector for tube robot 1.

To create a new multi channel arm vector, right-click the group heading *Multi Channel Arm Vectors*, choose *New*, enter a descriptive name of your choice and click OK to open the Teach Multi Channel Arm Vector dialog box (see 9.6.2 “Teach Plate Robot Vector Dialog Box”, 🗎 9-59).

To view and/or edit plate robot and multi channel arm vectors which are associated with carriers, double click on the carrier in the Labware section of the Control Bar and click *Edit*. To view and/or edit tube robot vectors which are associated with labware items, double click on the labware item in the Labware section of the Control Bar and click *Edit*.

5.4.1.7 Liquid Classes

Click this tab to view the available liquid classes. A liquid class is a set of liquid handling parameters. It specifies aspirating and dispensing speeds, airgaps, liquid detection modes, etc. The values of the parameters are dependent on the physical characteristics of the liquid. See 10 “Configuring Liquid Classes”, 🗎 10-1 for information on creating and editing liquid classes.

5.4.1.8 Carriers

Click this tab to view the available carriers. A carrier is a removable support on the instrument's worktable (i.e. deck) which holds one or more pieces of labware (e.g. a microplate) in place. The carrier name indicates the type of labware for which it is designed. Optional devices which can be placed on the worktable (e.g. the Te-Shake shaker) are also treated as carriers.

Carriers are normally fitted to the instrument’s worktable at pre-defined grid positions (see Fig. 11-8, 🗎 11-20).

The Carriers tab is subdivided into groups for Devices, Hotels, Microplate Carriers, DITI Carriers, Wash Stations, Trough Carriers, Tube Carriers (tube racks) and Miscellaneous Carriers.

See 9.5 “Configuring Carriers”, 🗎 9-39 for information on creating and editing carrier templates.

The Freedom EVOware database already contains a large selection of pre-defined carrier types. You only need to create or edit carriers if you cannot find a standard item which is suitable for your needs.

5.4.1.9 Labware

Click this tab to view the available labware. Labware refers to consumable items such as microplates or sample tubes. Microplates have a regular arrangement of containers or cavities (wells) for holding liquids or samples. To allow pipetting, microplates are normally placed on microplate carriers and tubes are inserted in tube racks.

The Labware tab is subdivided into groups for Microplates, Tips, Wash and Waste, Troughs, Tubes, Miscellaneous and Allowed Labware.

Allowed Labware shows the labware types which are compatible with the currently selected carrier. If you have already put a carrier onto the Worktable Editor, click on it to see which labware types are allowed.

See 9.4 “Configuring Labware”, 9-15 for information on creating and editing labware templates.

The Freedom EVOware database already contains a large selection of pre-defined labware types. You only need to create or edit labware if you cannot find a standard item which is suitable for your needs.

5.4.1.10 Search

Click this tab to view the Control Bar objects which were found using the search function.

5.4.1.11 Searching for objects in the Control Bar

To search for any object or command in the Control Bar, enter the name or part of the name in the text field at the bottom and click . The search results are shown in the Search tab of the Control Bar.

5.4.1.12 Context Menu for Objects in the Control Bar

Right-click on an object in the Control Bar to open the context menu. The context menu is context sensitive and the options it contains depend on the currently active Control Bar tab and on the object you have selected. The available options in the context menu are as follows:

Edit
Edit the selected object.

Delete
Delete the selected object.

New
Create a new object of the same type.

Duplicate
Duplicate the selected object. You will be prompted for a new name.

Rename
Rename the selected object. You will be prompted for a new name.

Add to favorites
Add the selected object to the My Favorites tab of the Control Bar.

Remove from favorites
Remove the selected object from the My Favorites tab of the Control Bar.

Hide

Hides the selected object. Use this feature if you want to hide items which you do not normally use. Depending on the Show/Hide status of the Control Bar, the object will either disappear immediately or it will be shown in gray. See 5.4.1.13 “Context Menu for Group Titles in the Control Bar”, 5-15.

Show

Shows the selected object (cancels the hidden status). Before you can do this you must make the hidden objects visible (see 5.4.1.13 “Context Menu for Group Titles in the Control Bar”, 5-15).

Run Command

This option is only available for device commands and is used for service purposes, e.g. to initialize the device manually or to test correct functioning (see 16.1 “Service Functions”, 16-1). See 6.4.2 “Run Maintenance”, 6-10 for information on instrument maintenance functions. Maintenance functions are scripts which are created using the Script Editor.

5.4.1.13 Context Menu for Group Titles in the Control Bar

Right click on a group title in the in the Control Bar to open the context menu. The context menu is context sensitive and the options it contains depend on the currently active Control Bar tab and on the group title you have selected (e.g. “Carriers”). The available options in the context menu are as follows:

Edit

Edit the selected object.

New

Create a new object.

Show hidden items

Shows all objects you have marked as hidden in gray. This allows you to cancel the hidden status of an object. To cancel the hidden status, right-click on the object and choose Show.

Hide hidden items

Completely hides all objects you have marked as hidden.

5.4.2 Infopads

Infopads are small windows which contain prompts, hints or context-related information on the task which is currently being carried out or the object which is currently selected. The Infopads are positioned to the right of the Control Bar.

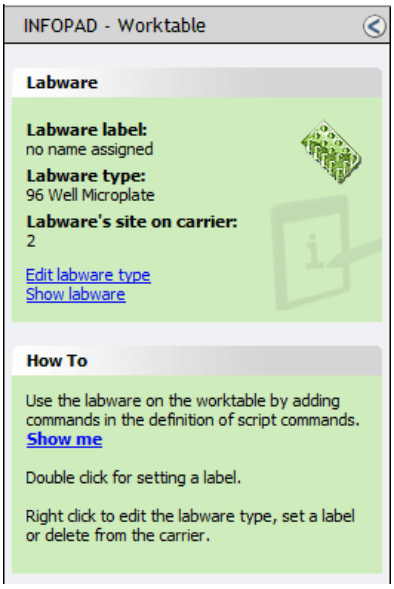

INFOPAD - Worktable
Labware
Labware label:
no name assigned
Labware type:
96 Well Microplate
Labware's site on carrier:
2
Edit labware type
Show labware
How To
Use the labware on the worktable by adding commands in the definition of script commands.
Show me
Double click for setting a label.
Right click to edit the labware type, set a label or delete from the carrier.

Fig. 5-10 *Lower infopad with a labware item selected*

If your pipetting script contains Comment commands, the comment texts and the corresponding script line numbers are listed as hyperlinks in the upper Infopad. Click on one of the entries to jump to the script line which contains the Comment command (**script navigation feature**). See 15.37 “Comment Command”, 15-97 for more information.

If you need more space for the Process Editor or the Worktable Editor, you can collapse the upper and/or lower Infopad by clicking in the title bars. You can also resize the windows by dragging the dividers between the windows.

The hyperlinks in the *How To* section of the infopads take you to short animations (films) which demonstrate the currently selected task. The animations are stored in AVI format and will be shown e.g. in Windows Media Player.

5.4.2.1 Hyperlinks in the Infopads

The infopads are provided with hyperlinks (blue underlined text) which are shortcuts to commonly needed actions. The hyperlinks are context sensitive and the available options depend on what you have selected (e.g. a carrier or labware item in the Worktable Editor):

Edit carrier type

This option is shown when you select a carrier or a carrier which is a device. It opens the Edit Carrier dialog box and is equivalent to double-clicking the selected carrier in the Control Bar.

Edit labware type

This option is shown when you select a labware item. It opens the Edit Labware dialog box and is equivalent to double-clicking the selected labware item in the Control Bar.

Edit liquid class

This opens the Liquid Class Editor and is equivalent to double-clicking the selected liquid class in the Control Bar.

Show labware

This option is shown when you select a carrier or a carrier which is a device. It opens the Labware tab of the Control Panel. Allowed Labware then shows the labware types which are compatible with the selected carrier.

Show me

This runs a short animation (film) to demonstrate the currently selected task. The animations are stored in AVI format and will be shown e.g. in Windows Media Player.

5.4.3 The Process Editor (Freedom EVOware Plus)

In Freedom EVOware Plus, the sequence of steps which are required to carry out a particular application or experiment, for example to extract the substance you are looking for, is called a process. The process specifies the operations you want the pipetting instrument to execute. Processes are set up in the Process Editor, which is shown at the top right of the screen.

In the Process Editor, each process step (such as centrifuging a plate or pipetting to a plate) is shown as an icon, whereby each icon is associated with a single device such as a centrifuge, a storage device or the liquid handling arm.

See 13.2 “Overview of Device Commands”, 13-12 for a list of device commands which are provided with the standard Freedom EVOware installation. When installing Freedom EVOware, you normally only install the device drivers which you want to use.

There are four basic types of icon - process steps, labware source icons, final position icons and on-the-fly icons:

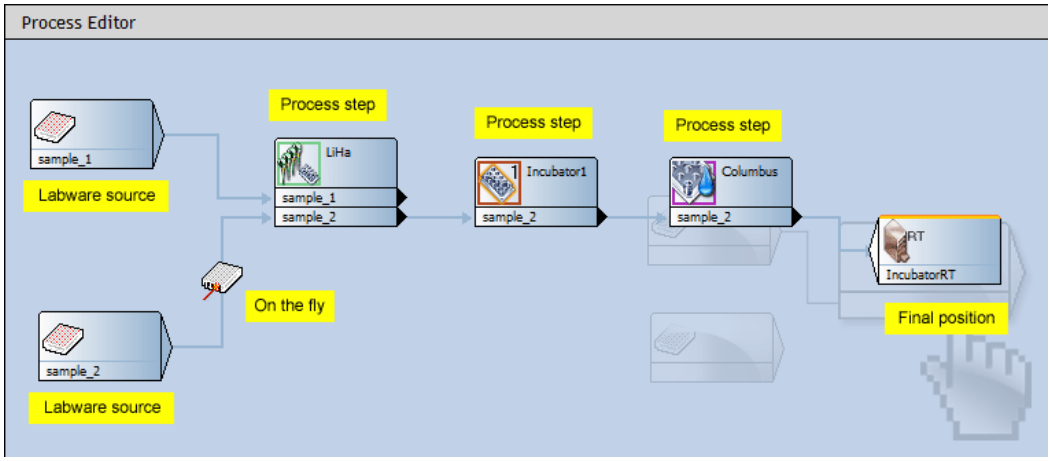


Fig. 5-11 *Process Editor showing an example process*

If you need more space for the Process Editor, you can collapse the Worktable Editor by clicking in the title bar. In addition, you can collapse the Infopad windows by clicking in the title bars. You can also resize the windows by dragging the dividers between the windows.

Process steps are created by dragging commands from the Control Bar onto the Process Editor. A process is then created by interlinking the process steps to create the workflow which is required by your application or experiment.

The bottom part of each process step icon shows the name or names of the labware items which are involved in the operation (so-called object parameters).

Each process step is associated with a single device, and devices can typically carry out several different functions. For example, a plate washer may have a washing function, a priming function and an initialization function. This is handled by associating the process step with a command. Each device driver contains a pre-configured command for each of the device functions (the available commands are shown in the Commands section of the Control Bar, below the symbol for the device). Many of the commands have one or more execution parameters (such as the duration of the washing operation). When you create a process step by dragging the command onto the Process Editor, you will be prompted to specify the execution parameters.

Each command can be associated with pre-actions and/or post-actions – additional commands which are carried out before and after the main command. For example, if you want to scan a plate in a Tecan Ultra reader with the Measure command, it is necessary to move the plate to the reader using the plate robot (with the RoMa_MoveObject command) and to open the reader door before the plate gets there (with an Ultra_Open command). Another RoMa_MoveObject command and an Ultra_Close command are needed when the scanning operation is finished. The process diagram is simplified by implementing these standard actions using pre-actions and post-actions which are linked to the Measure command. It avoids having to specify additional process steps. In most cases, Freedom EVOware configures suitable pre-actions and post-actions for you automatically. This applies above all to the plate robot (RoMa_MoveObject command).

Freedom EVOware keeps track of the location of the labware on your instrument, and - to take the above example - automatically configures a suitable RoMa_MoveObject command to move the plate from its current location to the reader.

The pipette command for the liquid handling arm has a large number of sub-commands which are used for writing so-called scripts. In Freedom EVOware Plus, if you drag the pipette command onto the Process Editor, this opens scripting mode and the Process Editor is replaced by the Script Editor (see below).

Labware source icons are used at the start of a process to represent the source of the labware items (e.g. microplates or tubes) which are needed by the process. See 11.6 “Labware Generator (Freedom EVOware Plus)”, 🗎 11-16 for information on creating labware source icons.

Final position icons are used to specify the final position of the labware after the process has finished. They are often associated with a storage device such as a hotel or with a waste position for discarding used labware. Final position icons are not necessary if you want to return the labware to its original position after the process has finished, for example back to a storage device such as a carousel (the “base” location). Final position icons are created by right-clicking on the background of the Process Editor and choosing Choose Final Position from the context menu.

On-the-fly icons represent on-the-fly devices. Such devices always require the use of a plate robot (RoMa) to carry out their function. A typical example of this type of icon is the Symbol barcode scanner which is rigidly fixed to the instrument's deck and cannot move towards the labware to scan it. Instead, a plate robot is used to move the labware past the barcode scanner “on-the-fly” while carrying out something else, for example when moving the labware from one carrier (or process step) to another. The barcode scanner is then instructed to perform a read operation when the plate robot presents the labware. An on-the-fly icon for the barcode scanner is created by dragging the Barcode scanner command from the Control Bar onto a line which links two process steps.

See 11 “Getting Started - Setting Up a New Script or Process”, 🗎 11-1 for more information.

5.4.3.1 Context Menu for the Process Editor

Right-click on the Process Editor to open the context menu. The context menu is context sensitive and the options it contains depend on what you have selected (a process step icon or the background). The available options in the context menu are as follows if you select the background of the Process Editor:

Choose Final Position

This option adds a final position icon for labware. Final position icons are used to specify the final position of the labware after the process has finished. Final position icons are not necessary if you want to return the labware to its original position after the process has finished. See the above description of the Process Editor.

Paste

This option is available if you have selected a process step and choose Copy.

Arrows

This option allows you to choose between Rectangular and Straight arrows for the lines which connect the process steps. The choice you make solely depends on your personal taste.

See 9.10 “Local Settings for Process Steps (Context Menu)”, 9-70 and 9.11 “Local Settings for Labware Source Icons (Context Menu)”, 9-77 for information on the options in the context menu if you select a process step.

5.4.4 The Script Editor

The Script Editor, which is shown at the top right of the screen, is used to set up a pipetting (liquid handling) script.

Freedom EVOware Plus

To open the Script Editor in Freedom EVOware Plus, select the Pipette command in the Control Bar (Liquid Handling Arm section) and drag it to the Process Editor window.

After creating the script, click the Accept to accept your changes and return to the Process Editor. If you want to edit or view the script later, you can open the Script Editor again by double-clicking on the icon for the Pipette command in the Process Editor.

Freedom EVOware Standard

Freedom EVOware Standard does not have a Process Editor, and displays the Script Editor as soon as it has started.

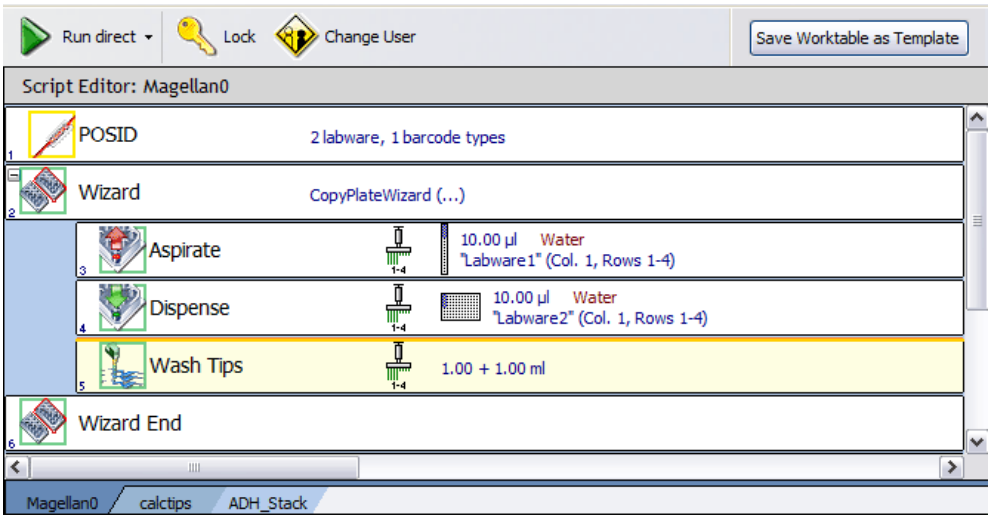


Fig. 5-12 *Script Editor with three scripts open*

If you have opened more than one pipetting script, click the tabs below the Script Editor window if you want to view, edit, save or close one of the other scripts.

If you need more space for the Script Editor, you can collapse the Worktable Editor by clicking in the title bar. In addition, you can collapse the Infopad windows by clicking in the title bars. You can also resize the windows by dragging the dividers between the windows.

5.4.4.1 Context Menu for the Script Editor

Right-click on the Script Editor to open the context menu. The available options in the context menu are as follows:

Edit

Edit the selected script line.

Delete

Delete the selected script line(s).

Cut

Cut the selected script line(s).

Copy

Copy the selected script line(s).

Paste

Paste the script line(s) in the clipboard at the current cursor position.

Seach & Replace

Opens the *Search and Replace* dialog box which allows you to replace strings in the pipetting script (e.g. the string you have specified in the User Prompt command). If you do not specify a string in the *Replace with* field, matching strings are deleted (you cannot carry out a search without replacing).

Context Menu for the Tabs of the Script Editor

Save

Save the selected script.

Close

Close the selected script.

Open

Open an additional script.

5.4.5 Worktable Editor

The Worktable Editor at the bottom right of the screen is a graphical representation of the pipetting instrument's worktable (deck). It shows the carriers and labware that are physically placed on the worktable. It also shows icons for the devices which are installed.

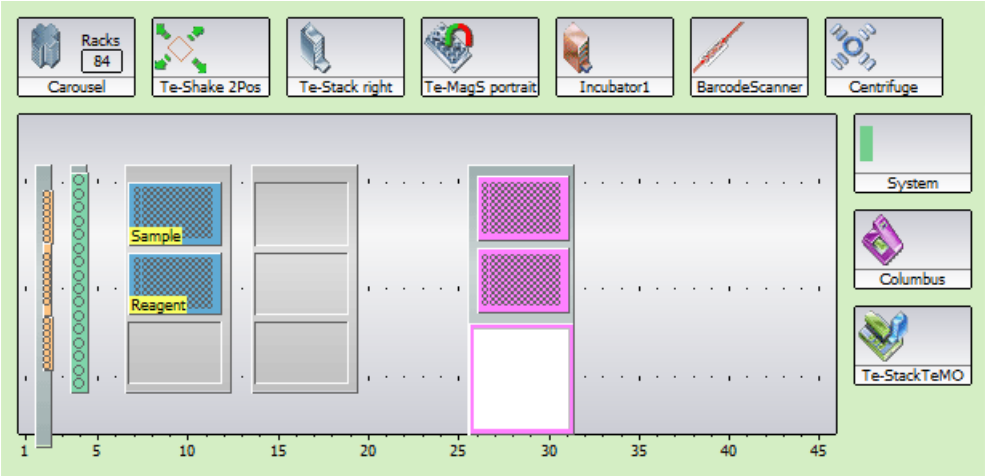


Fig. 5-13 *Example worktable showing carriers, labware and labware labels*

The gray area in the Worktable Editor represents that part of the worktable which can be accessed by the Liquid Handling Arm. This is called the pipetting area. The real worktable is normally larger than this. For example, hotels (storage shelves for plates) are normally put at the rear of the worktable, behind the pipetting area.

The displayed size of the worktable is scaled automatically depending on the size of the Worktable Editor window. The displayed size of the worktable will be very small if the Worktable Editor window is small and/or a large number of device icons are visible (i.e. you have installed a large number of devices).

In the above figure, 84 microplates have been put in the carousel.

If you need more space for the Worktable Editor, you can collapse the Infopad windows by clicking in the title bars. You can also resize the windows by dragging the dividers between the windows. In addition, you can rearrange the device icons by dragging them to the required position.

Before programming your pipetting operations, you need to place the carriers and labware which you want to use on to the worktable.

The worktable layout is stored in the script or process file together with the information on the script or process.

5.4.5.1 Shared worktable layouts

Freedom EVOware detects automatically if scripts, processes, maintenance scripts and templates use an identical worktable layout. If you save one of these file types after changing the worktable layout, you will be asked whether you also want to update the worktable information in the other files which share the same worktable.

If you are saving a pipetting script, you will only be prompted about other pipetting scripts, maintenance scripts or script templates which share the same worktable layout. If you are saving a process, you will only be prompted about other processes or process templates which share the same worktable layout.

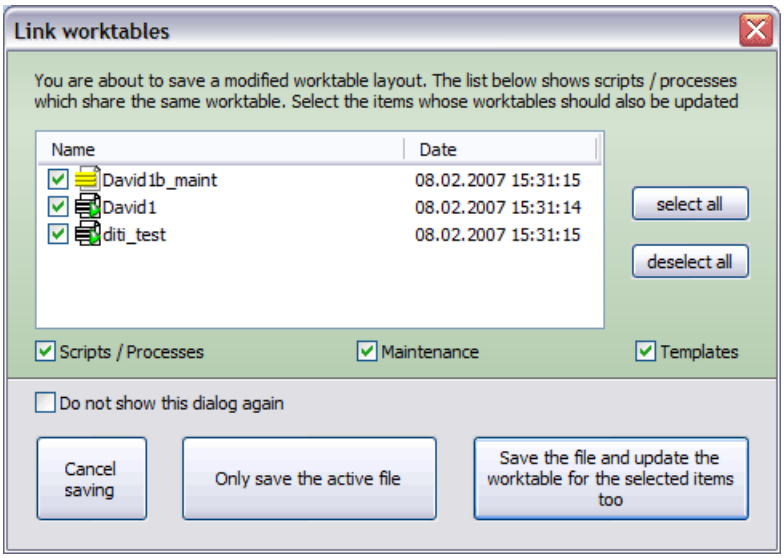

Link worktables
You are about to save a modified worktable layout. The list below shows scripts / processes which share the same worktable. Select the items whose worktables should also be updated
Name
Date
David1b_maint
08.02.2007 15:31:15
David1
08.02.2007 15:31:14
diti_test
08.02.2007 15:31:15
select all
deselect all
Scripts / Processes
Maintenance
Templates
Do not show this dialog again
Cancel saving
Only save the active file
Save the file and update the worktable for the selected items too

Fig. 5-14 *Prompt when saving worktable layouts which are shared*

Select the files whose worktable you also want to update or choose *Cancel saving*. The list shows all files of the selected file types (Scripts / Processes), Maintenance and Templates) which share the same worktable layout.

The following options are available:

Cancel saving

Cancel the saving operation.

Only save the active file

Update the file you are saving but do not update the other files which share this worktable.

Save the file and update the worktable for the selected items too

Update the worktable information for the active file and for the files you have selected.

If one of the other scripts which shares the same worktable layout is also currently open in the Script Editor, you will be prompted to save it first before updating.

Do not show this dialog again

Check this checkbox to hide this dialog box in future. In this case, Freedom EVOware will only save worktable layout changes for the current file in future. To make this dialog box appear again (i.e. to uncheck the checkbox), press the Shift key when you choose Save.

5.4.5.2 Context Menu for the Worktable Editor

Right-click on the Worktable Editor to open the context menu. The context menu is context sensitive and the options it contains depend on what you have selected (a carrier, a labware item or the background). The available options in the context menu are as follows:

Set Grid

This option is used to move a robot-only device (a device which is not accessible to the liquid handling arm) to a new position on the worktable. Choose the required grid position and click OK. Tip: If you click on a device icon in the Worktable Editor, an orange line shows the grid position which is occupied by the device.

To move a carrier to a new position, click the edge of the carrier to select it and drag to the required position.

Modify labware

This option is only available for generated labware (labware in feeder devices or a labware repository on the worktable) and is only for Freedom EVOware Plus. It opens the labware generator to allow you to edit the settings you have made (see 11.6 “Labware Generator (Freedom EVOware Plus)”, 11-16).

Edit labware type

This option is used to edit labware definitions.

Set label

This option is used to assign a label (i.e. a user-defined name) to the selected labware item.

Edit carrier

This option is used to edit carrier definitions.

Delete

This deletes the selected object. You cannot delete carriers if labware is already positioned on the carrier (you must delete the labware first).

Automatic replace

This activates the automatic DITI handling feature for the selected site. This option is only available for Freedom EVOware Plus and is only available for DITI racks. See 17.1 “Using the Automatic DITI Handling feature”, 17-1.

Waste for DiTi racks

This activates the automatic DITI rack waste feature for the selected site. This option is only available for Freedom EVOware Plus and is only available for the DITI waste site of a DITI carrier with waste. It is intended for discarding empty stackable DITI racks and spacers. See 17.1 “Using the Automatic DITI Handling feature”, 17-1.

Save worktable as template

This option is used to save the current worktable layout as a template. The template file which is saved contains configuration settings for Freedom EVOware, for example the positions of the devices and the labware in the Worktable Editor. To choose this option, right click on the worktable (but not on labware items).

5.5 Exiting Freedom EVOware

To exit Freedom EVOware, choose *Exit* or *Exit, unload drivers* in the File menu.

In the latter case, you will be shown a progress bar as Freedom EVOware unloads all of the software components and device drivers. If errors are detected when unloading the device drivers, a dialog box will appear with status messages. Use the scroll bar to inspect last column (Info), which explains the reason for the error.

In Freedom EVOware Plus, you must first close the Script Editor before you can exit.

6 Menus

This chapter describes the menus in the Freedom EVOware software. It also describes the toolbar.

The menus are only available if you have been given Freedom EVOware Administrator or Application Specialist rights in the Tecan User Management system. Freedom EVOware Operators are only allowed to run existing scripts or processes and/or instrument maintenance scripts (see 7.2 “Freedom EVOware Access Rights (User Levels)”, 7-3).

Most of the features and dialog boxes in Freedom EVOware are provided with context-sensitive help. See 1.5 “Context-Sensitive Help System”, 1-5 for more information.

6.1 File Menu

Freedom EVOware Standard, Freedom EVOware Plus

This menu lets you create a new Freedom EVOware script or process, to open an existing script or process, to save the current script or process, to print the contents of a script or process, to run the Start Up Wizard, to Lock Freedom EVOware if you want to leave the PC unattended and to quit Freedom EVOware.

6.1.1 New

Freedom EVOware Standard, Freedom EVOware Plus

This option lets you create a new script or process. A dialog box is opened to allow you to choose an existing script or process template:

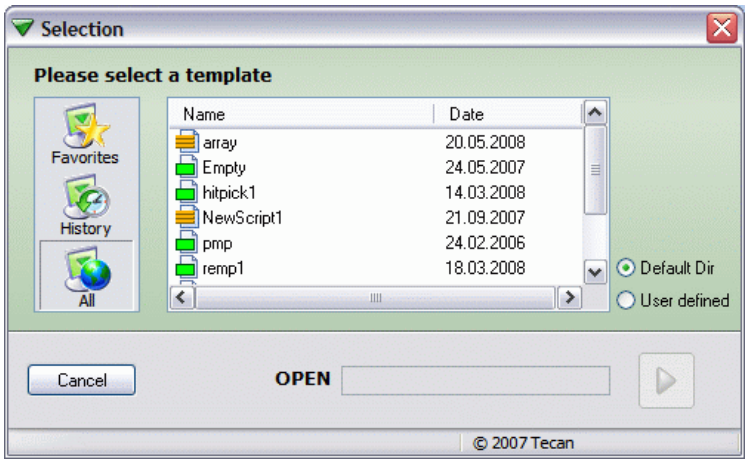


Fig. 6-1 *Choosing a template file*

Choose the required template and click the green arrow.

Click *Default Dir* to choose a template from the default template directory for scripts or processes. Click *User defined* and navigate to another directory to choose a template from a different location. The currently chosen directory is shown in the dialog box.

If required, click the column headers Name or Date to sort the list by name or date. Type the first letter of the template name to jump to templates starting with that letter.

Template files with a green icon (“worktable templates”) only contain worktable settings for Freedom EVOware, for example the positions of the devices and the labware in the Worktable Editor.

Template files which contain pipetting scripts (“script templates”) have a brown icon.

Template files which contain processes (“process templates”) have a blue icon.

Non-validated files are shown with a gray icon if you have enabled the file validation feature (see C.2 “Setting the Validation Status of Scripts and Processes”, C-4).

Click *All* if you want to see all of the templates which are available. Click *History* to see the most recently used templates. Click *Favorites* to see your favorite templates.

Context menus for this dialog box

Add to favorites

Right click a template in the All or History view and choose *Add to favorites* from the context menu to add the template to the Favorites view.

Remove from favorites

Right click a template in the Favorites view and choose *Remove from favorites* from the context menu to remove the template from the Favorites view.

Views

Right click the Favorites, History or All button to open a context menu. You can then choose the view which you prefer to use (Favorites, History or All) the next time you open this dialog box.

Validate, Remove validation

These two options are only shown if you have enabled the file validation feature. See C.2 “Setting the Validation Status of Scripts and Processes”, C-4.

6.1.2 Open

Freedom EVOware Standard

This option opens an existing script. A dialog box is opened to allow you to choose the script you want:

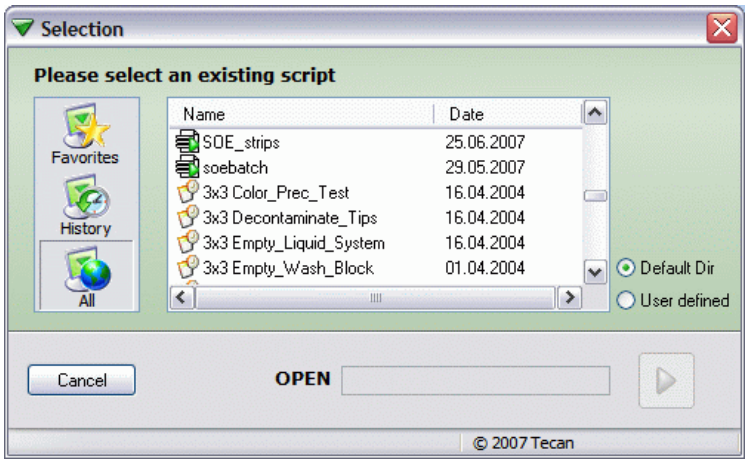


Fig. 6-2 *Choosing an existing script*

Choose the required script file and click the green arrow.

Click *Default Dir* to choose a script from the default script directory. Click *User defined* and navigate to another directory to choose a script from a different location. The currently chosen directory is shown in the dialog box.

If required, click the column headers Name or Date to sort the list by name or date. Type the first letter of the script name to jump to scripts starting with that letter.

Click *All* if you want to see all of the scripts which are available. Click *History* to see the most recently used scripts. Click *Favorites* to see your favorite scripts.

Script files have a green icon. Maintenance scripts have a light orange icon and are are listed after the normal scripts.

Non-validated files are shown with a gray icon if you have enabled the file validation feature (see C.2 “Setting the Validation Status of Scripts and Processes”, C-4). They are not shown at all if your Freedom EVOware access level is *Operator*.

Context menus for this dialog box

Add to favorites

Right click a script in the All or History view and choose *Add to favorites* from the context menu to add the script to the Favorites view.

Remove from favorites

Right click a script in the Favorites view and choose *Remove from favorites* from the context menu to remove the script from the Favorites view.

Views

Right click the Favorites, History or All button to open a context menu. You can then choose the view which you prefer to use (Favorites, History or All) the next time you open this dialog box.

Validate, Remove validation

These two options are only shown if you have enabled the file validation feature. See C.2 “Setting the Validation Status of Scripts and Processes”, C-4.

Freedom EVOware Plus

This option opens an existing process. A dialog box is opened to allow you to choose the process you want:

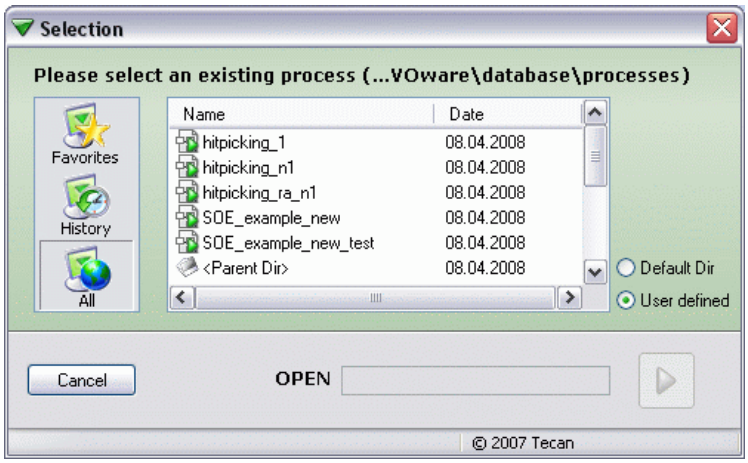


Fig. 6-3 *Choosing an existing process*

Choose the required process file and click the green arrow.

Click *Default Dir* to choose a process from the default process directory. Click *User defined* and navigate to another directory to choose a process from a different location. The currently chosen directory is shown in the dialog box.

Note: *You must use the Export/Import Tool if you want to transfer processes between different Freedom EVOware installations. Do not open and run a process which has been saved on a network drive or USB stick by a different Freedom EVOware installation. The process file may not contain all of the information required to run the process correctly.*

If required, click the column headers Name or Date to sort the list by name or date. Type the first letter of the process name to jump to processes starting with that letter.

Click *All* if you want to see all of the processes which are available. Click *History* to see the most recently used processes. Click *Favorites* to see your favorite processes.

Non-validated files are shown with a gray icon if you have enabled the file validation feature (see C.2 “Setting the Validation Status of Scripts and Processes”, C-4). They are not shown at all if your Freedom EVOware access level is *Operator*.

Context menus for this dialog box

Add to favorites

Right click a process in the All or History view and choose *Add to favorites* from the context menu to add the process to the Favorites view.

Remove from favorites

Right click a process in the Favorites view and choose *Remove from favorites* from the context menu to remove the process from the Favorites view.

Views

Right click the Favorites, History or All button to open a context menu. You can then choose the view which you prefer to use (Favorites, History or All) the next time you open this dialog box.

Validate, Remove validation

These two options are only shown if you have enabled the file validation feature. See C.2 “Setting the Validation Status of Scripts and Processes”, C-4.

6.1.3 Save

Freedom EVOware Standard

This option lets you save the current script. The file which is saved also contains information on the worktable layout which is used:

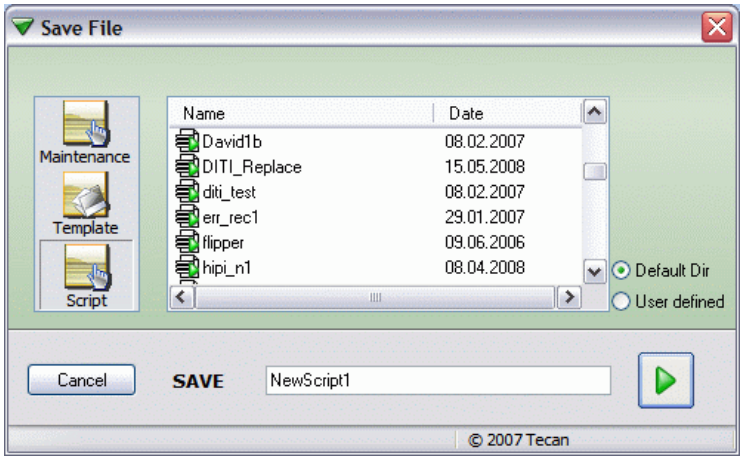


Fig. 6-4 *Saving a script*

Enter the required name of the script and click the green arrow.

Click *Default Dir* to save the script in the default script directory. Click *User defined* and navigate to another directory to save the script in a different location. The currently chosen directory is shown in the dialog box.

Click *Script* to save a normal script. Click *Template* to save a script template. Click *Maintenance* to save a maintenance script (see 6.4.2 “Run Maintenance”, 6-10). Maintenance scripts are normal scripts which are saved in a special directory. You cannot choose a user defined directory for maintenance scripts.

Freedom EVOware Plus

This option lets you save the current process. You will be prompted for a file name if you have not already assigned one. The file which is saved also contains information on the worktable layout which is used:

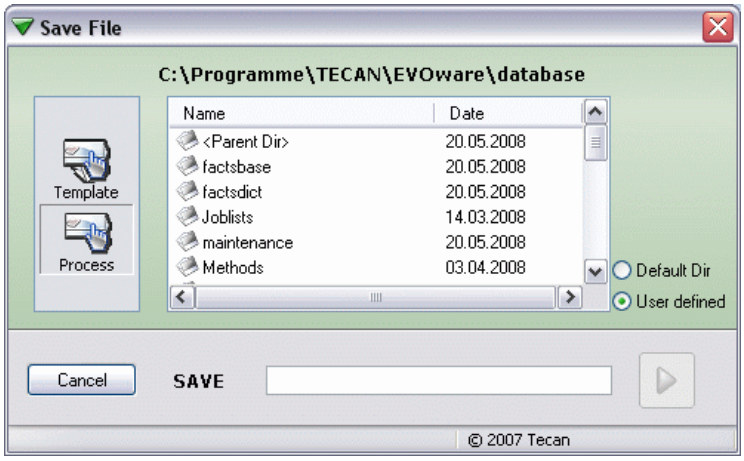


Fig. 6-5 *Saving a process*

Enter the required name of the process and click the green arrow.
Click *Default Dir* to save the process in the default process directory. Click *User defined* and navigate to another directory to save the process in a different location. The currently chosen directory is shown in the dialog box.
Click *Process* to save a normal process. Click *Template* to save a process template.

Note: *If you save a process on a network drive or USB stick, do not open it using a different Freedom EVOware installation. The process file may not contain all of the information required to run the process correctly on the other PC. You must use the Export/Import to to transfer processes between different Freedom EVOware installations.*

6.1.4 Save As ...

Freedom EVOware Standard, Freedom EVOware Plus

This option lets you save the current script or process using a different file name to before. You will be prompted for the file name. See 6.1.3 “Save”, 🗎 6-5 for additional information.

6.1.5 Delete

This option lets you delete a script, process or method.

6.1.6 Print

If you have a printer connected to your computer, this option lets you print Freedom EVOware scripts and processes. The following items are printed:

Freedom EVOware Standard

- The script
- The worktable layout
- The name of the script
- The name of the currently logged in user
- The page number, time and date

Freedom EVOware Plus

If the Process Editor is open:

- The process diagram
- Information on each of the process steps
- The worktable layout
- The name of the currently logged in user
- The page number, time and date

If the Script Editor is open:

- The script
- The worktable layout
- The name of the script and the name of the process which uses it
- The name of the currently logged in user
- The page number, time and date

6.1.7 Start Up Wizard

This option runs the Start Up Wizard. See 5.2 “Startup Wizard, Freedom EVOware Standard”, 5-5 and/or 5.3 “Startup Wizard, Freedom EVOware Plus”, 5-7.

6.1.8 Recent Scripts

This menu item is only shown in Freedom EVOware Standard. Freedom EVOware keeps a list of up to eight of the most recently used scripts. You can open one of the recent scripts by choosing it from the list.

6.1.9 Lock EVOware

This option is used to log out the current Freedom EVOware user. To prevent unauthorized use of the software, you should do this if you plan to leave the PC and the pipetting instrument unattended.

You must log in to Freedom EVOware again to regain control of the program.

Another use of the Lock function is to switch Freedom EVOware users when you are handing over to another employee due to a change of laboratory staff (evening shift etc.). In this case, you should log out and immediately log in again with the new user name.

If you log out while a script or process is running, the script or process continues to run. All other Freedom EVOware functions are disabled until you log in again.

Note: *In an emergency, you can stop the script or process (i.e. the pipetting) by pressing the Pause button on the pipetting instrument.*

Note: *Irrespective of the Lock Freedom EVOware feature, users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected (see 7 "Tecan User Management System", 7-1).*

6.1.10 Exit

This option closes all currently open scripts and/or processes, de-initializes the instrument, saves configuration settings and quits Freedom EVOware.

6.1.11 Exit, Unload Drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see 5.1.2 "Driver pre-loading", 5-2). Choose this option if you want to unload the Tecan drivers when you quit Freedom EVOware. The drivers should be unloaded e.g. if Freedom EVOware reports an internal error. The drivers will be loaded again when you re-start Freedom EVOware.

If you run Freedom EVOware for an extended period without unloading the drivers, this can result in a slight degradation of the performance (throughput of your scripts and processes). Accordingly, we recommend you to unload the drivers using the menu option Exit, Unload Drivers and then to restart Freedom EVOware every six or seven days. Microsoft Windows, too, can suffer from a slight degradation of the performance - independently of Freedom EVOware - if you do not shut down and then restart your PC from time to time.

The driver pre-loading feature can be disabled in the Configuration Tool (see 8.4.1.1 "Device Information Tab", 8-21).

Note: *If you have made configuration changes using the Configuration Tool, the drivers will be unloaded automatically when you quit Freedom EVOware.*

6.2 Edit Menu

This menu lets you cut, copy and paste Freedom EVOware script commands and process steps (see 11.4 "Setting Up a Pipetting Script in Freedom EVOware Standard", 11-4) and 11.5 "Setting Up a Process in Freedom EVOware Plus", 11-7.

6.2.1 Undo / Redo

The two options in this sub-menu are used to undo and redo changes you have made to a pipetting script in the Script Editor.

6.2.2 Undo / Redo Configuration

The two options in this sub-menu are used to undo and redo changes you have made to the Freedom EVOware configuration settings for carriers, labware, liquid classes and robot vectors.

6.2.3 Cut / Copy / Paste

Freedom EVOware lets you duplicate and move script commands and process steps using Cut, Copy & Paste. The same options are available if you right-click in the Script Editor or Process Editor.

6.2.4 Search & Replace

This menu opens the *Search and Replace* dialog box which allows you to replace strings in the pipetting script (e.g. the string you have specified in the User Prompt command). If you do not specify a string in the *Replace with* field, matching strings are deleted (you cannot carry out a search without replacing).

6.2.5 Auto-Validation

Pipetting scripts are normally checked for errors automatically when you add each new command to the script (11.4.2.1 “Checking the Pipetting Script for Errors”, 11-5). Choose this menu item to toggle auto-validation on and off (a check mark alongside this menu item shows that auto-validation is switched on).

If the script contains errors and auto-validation is switched on, the faulty command(s) are marked in red and you cannot click Run in the Toolbar to start the Runtime Controller and run the script.

If the script contains errors and auto-validation is switched off, the faulty command(s) are not marked in red and you can click Run in the Toolbar to start the Runtime Controller. Uncheck the *Run full script* checkbox in the Runtime Controller if you want to run part of the script only, e.g. for testing purposes. If you run the full script, you will get errors. The errors are shown in the Log window.

6.2.6 Validate Script

This menu item is used to validate a pipetting script manually (i.e. check for errors). You can only choose this menu item if you have switched off auto-validation. If auto-validation is switched on, the script is validated automatically when you add each new command to the script. See also 11.4.2.1 “Checking the Pipetting Script for Errors”, 11-5.

6.3 View Menu

This menu lets you view or hide the Worktable Editor, Infopads and Log Window.

6.3.1 Worktable

This option is used to view or hide the Worktable Editor.

6.3.2 Infopads

This option is used to view or hide the Infopads for the Process Editor or the Script Editor (upper infopad) or the Worktable Editor (lower infopad).

6.3.3 Log Window

This option is used to view or hide the Log window, a troubleshooting tool that tracks every command sent by the computer to the instrument, every response returned from the instrument to the computer and any user input. The content and format of the log corresponds to a Full log file of type LOG (see A.1 “Overview of the Log Files”, A-1).

6.4 Execute Menu

This menu lets you run scripts and processes, run instrument maintenance functions, run tools and VB scripts and declare variables for use in scripts.

6.4.1 Run

This option is used to run scripts and processes. See 12 “Running Scripts and Processes”, 12-1.

6.4.2 Run Maintenance

This option is used to run maintenance scripts for the pipetting instrument and/or optional devices. Maintenance scripts are normal scripts which are saved in a special directory. They are created using the Script Editor. Maintenance scripts can only be created by the Freedom EVOware Administrator or Application Specialist.
The following script commands are mainly intended for use in maintenance scripts:

- Fill System (384 tip head) (see 15.56.13, 15-138),
- Load the Te-MO (see 15.56.12, 15-138),
- Manual Tip Alignment (see 15.27, 15-57).

The following script commands are also useful in maintenance scripts:

- Wash Tips (see 15.4, 15-8),
- Drop DiTis (see 15.8, 15-14),
- Set DiTi Position (see 15.9, 15-15),
- Send Command (see 15.67, 15-158).

The following device command is also useful in maintenance scripts:

- Carousel - ReadAllBarcodes.

A selection of commonly-needed maintenance scripts are provided with the Freedom EVOware installation. The purpose of each of the scripts is explained in a Comment command at the start of the script. The scripts are intended for both

Freedom EVOware Plus and Freedom EVOware Standard, but they can only be viewed and modified by loading Freedom EVOware Standard.

Freedom EVOware Standard

To create a maintenance script, specify the script in the Script Editor, click Save and click the Maintenance button in the Save File dialog box. The script will then appear automatically in the Run Maintenance menu. Choose the script from the maintenance menu when you want to execute the maintenance function. If you want to make changes to the maintenance script, edit it using the Script Editor and save it again.

Freedom EVOware Plus

To create a maintenance script, specify the script in the Script Editor, click Save as Template and click the Maintenance button in the Save File dialog box. The script will then appear automatically in the Run Maintenance menu. Choose the script from the maintenance menu when you want to execute the maintenance function.

Freedom EVOware Plus cannot load a maintenance script to make changes. Instead, Freedom EVOware Plus users should load Freedom EVOware Standard instead, which allows you to edit the script using the the Script Editor.

Note: *In Freedom EVOware Plus, you cannot use device commands in scripts. To create maintenance scripts which contain device commands, Freedom EVOware Plus users should load Freedom EVOware Standard to create the script. The maintenance scripts you create with Freedom EVOware Standard are also available in Freedom EVOware Plus.*

It is recommended to choose descriptive file names for the maintenance scripts to ensure that their purpose is clear to instrument operators.

6.4.3 Clear Recovery Status

Freedom EVOware provides functions for script and process error recovery. This allows aborted pipetting scripts and processes to be restarted where they were stopped (see 17.2 “ Script and process recovery function”, 🗎 17-5).

Use this menu option to clear the Recovery status if you want the script or process to start again at the beginning, even if it was not fully executed the last time it was run.

6.4.4 Tools

This option is used to run tools (external programs) manually, without running an Freedom EVOware script or process.

6.4.4.1 Creating Custom Menu Items for Tools (External Programs)

When it starts, Freedom EVOware scans the <install_path>\database\Tools directory for executable files with the extensions EXE, COM or BAT. The filenames then appear as custom entries in the Execute > Tools menu and allow the tools to be executed manually, without running a script or process.

See 15.36 “Execute Application Command”, 🗎 15-96 if you want to execute a tool from within an Freedom EVOware script.

6.4.5 VB Scripts

This option is used to run Visual Basic scripts manually, without running an Freedom EVOware script or process.

6.4.5.1 Creating Custom Menu Items for VB Scripts

When it starts, Freedom EVOware scans the <install_path>\Database\VBscripts directory for VB scripts. The filenames then appear as custom entries in the Execute > Tools menu and allow the VB scripts to be executed manually, without running a script or process.

See 15.50 “Execute VB Script Command”, 15-114 if you want to execute a VB script from within an Freedom EVOware script.

6.4.6 Declare Variables

This option, which is only available in Freedom EVOware Plus, is used to declare variables which can be shared between different pipetting scripts.

Freedom EVOware Plus processes can contain one or more pipetting scripts. in addition, Freedom EVOware Plus allows you to run several copies of the same process in parallel. Each copy of the process is called an instance. Freedom EVOware Plus also allows you to run different processes in parallel.

All variables (including pre-defined variables) must be declared before use (see also 14.1.1 “Declaring Variables in Scripts”, 14-1).

Variables in Freedom EVOware Plus can have one of three scopes (run, instance and script).

- **Run**: Variables with this scope are shared globally by all of the pipetting scripts in all instances of all processes.
- **Instance**: Variables with this scope are shared by all of the pipetting scripts in the same process or process copy.
- **Script**: Variables with this scope are declared in pipetting scripts with the Set Variable command (see 15.41 “Set Variable Command”, 15-101). They are not shared with other scripts.

If you declare a variable with scope **Run** or **Instance**, do not declare it again within a script. This will cause an error.

Note: *In Freedom EVOware Standard, all variables have the scope* ***Script*** *and are declared with the Set Variable command.*

6.4.6.1 Set Process Variables Dialog Box

This dialog box is used to declare variables of scope **Run** and/or **Instance** and is only available in Freedom EVOware Plus:

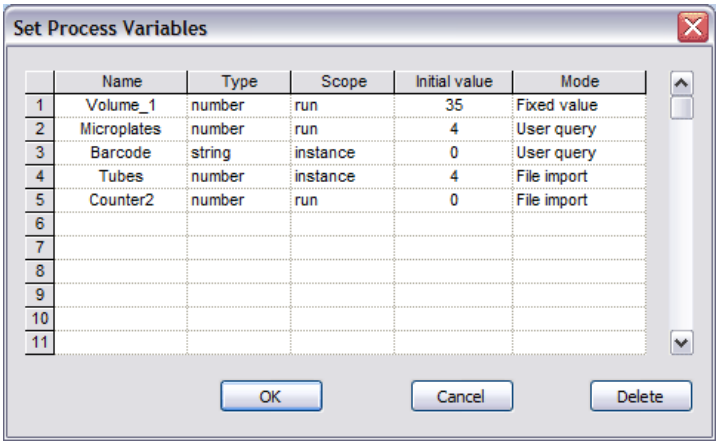


Fig. 6-6 *Set Process Variables dialog box*

Name

Specify the required variable name. Variable names can be 1 to 64 characters in length and must not begin with a digit. Variable names are not case-sensitive. See also 14.1 “Variables and Expressions in Scripts”, 14-1.

Note: *You are not allowed to declare pre-defined variables with this dialog box. See 14.1.4 “Pre-Defined Variables”, 14-4 for information on the reserved names for pre-defined variables. Pre-defined variables must be declared before use with the Set Variable command.*

Type

Choose either number (numeric variable) or string.

Scope

Choose either “run” or “instance” (see 6.4.6.4 “Scope of a Variable”, 6-15).

Initial value

Specify the required initial value.

Mode

Fixed value: The variable will be assigned the specified initial value.
User Query: The operator will be prompted for the value of the variable when the process is run (see below).
File import: The value of the variable will be imported from a file (see 6.4.6.3 “Import File for the Declare Variables Feature”, 6-14).

6.4.6.2 Set Process Variable Values Dialog Box

If you have declared variables with the Declare Variables feature in Freedom EVOware Plus and you chose User Query in the Set Process Variables dialog box, the following dialog box is shown when the process is run:

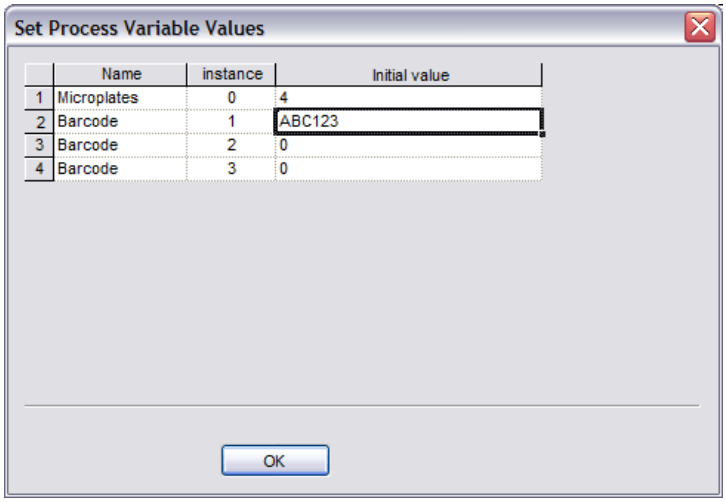


Fig. 6-7 *Set Process Variable Values dialog box*

Entered the required initial value for the variables in the *Initial value* column.

In the above example, the variables were declared as shown in Fig. 6-6, 🗎 6-13 and the number of process instances (process copies) was set to three in the Runtime Controller when the process was run.

The scope of the *Barcode* variable is **instance** and a different value can be entered for each of the three process instances. The scope of the *Microplates* variable is **run**; the value you specify will be used for all three process instances. This is indicated by the value 0 in the *Instance* column.

6.4.6.3 Import File for the Declare Variables Feature

If you choose *File Import* in the Mode column of the Set Process Variables dialog box, you must create a comma-separated text file which contains the required values of the variables. The file name must be <process name>_var.csv, for example myproc1_var.csv.

The file must be stored in the sub-directory which contains the process (the .epd file), for example:

C:\Program Files\Tecan\EVOware\database\processes\myproc1

Each line of the file should have the following syntax:

variable name,process instance,value

In the following example, the variables were declared as shown in Fig. 6-6, 🗎 6-13 and the number of process instances (process copies) will be set to three in the Runtime Controller when the process is run:

Tubes,1,5

Tubes,2,7

Tubes,3,4

Counter2,0,25

The scope of the *Tubes* variable is **instance** and a different value can be specified for each of the process instances. The scope of the *Counter* variable is **run**; the value you specify will be used for all three process instances. This is indicated by the value 0 in the Instance field.

For variables of scope **instance**, make sure that you specify enough lines for all of the process instances that you will run. If there are not enough entries in the file, Freedom EVOware will use the initial value that you specified in the Set Process Variables dialog box for the missing entries.

6.4.6.4 Scope of a Variable

The scope of a variable describes the extent of validity of the variable. For example, variables with the scope *script* only have meaningful values within the script within which they are declared. They are “unknown” to other scripts in the same process. If you re-use a script from another application and the scope of the variables it uses is “script”, you don’t need to check whether other scripts in your process use the same variable names, which could otherwise lead to unexpected results. On the other hand, if you want to exchange parameters with other scripts in the process, the scope of the respective variables must be *instance* or *run*. See also 14.1 “Variables and Expressions in Scripts”, 14-1.

Variable scope is only relevant in Freedom EVOware Plus.

6.4.7 Move Arms

This option is used to move the LiHa, the RoMa, the PnP, the MCA, the MCA384, the Te-MO or the PosID to the required position by pressing keys on the numeric keypad. See 9.3 “Moving the Arms and Other Devices”, 9-3.

6.4.8 Switch to real mode

This option is used to switch Freedom EVOware from offline mode to real mode (see 6.7.3 “Status Bar”, 6-20). In addition, the pipetting instrument will be initialized again if necessary.

For example, Freedom EVOware will switch to offline mode if an instrument error is detected and you click Abort in the Instrument Error dialog box. After resolving the cause of the error, you can use this option to switch back to real mode without needing to restart Freedom EVOware.

6.5 Administrator Menu

This menu is used to start the Configuration Tool, to change the password of the currently logged in user and to log in to Freedom EVOware as a different user without quitting Freedom EVOware.

6.5.1 Change User

This option is used to log in to Freedom EVOware as a different user without quitting Freedom EVOware first:

Fig. 6-8 *Change User dialog box*

6.5.2 Change Password

This option is used to change the password of the currently logged in user. You will be prompted to enter your old password and the new password:

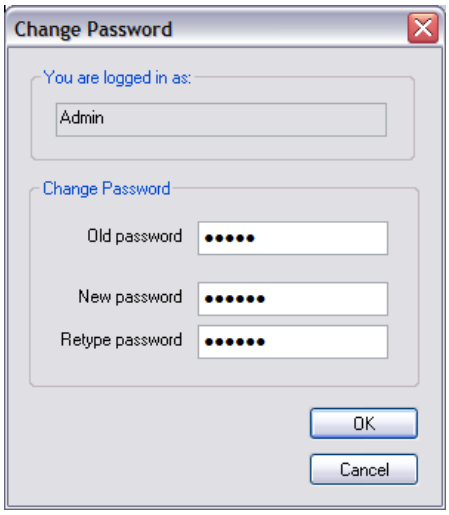


Fig. 6-9 *Change Password dialog box*

Passwords cannot be reused and must follow certain rules. Password rules are configured in Freedom EVOware's Configuration Tool (see 8.3.3 "User Management Section", 8-16.

6.5.3 Configure

This option is used to start the Configuration Tool (see 8 "Configuration Tool", 8-1). The Configuration Tool is used to configure general settings for Freedom EVOware. It also allows you to configure settings for the liquid handling arm, instrument options and optional devices and to set up Freedom EVOware users and groups.

6.6 Help Menu

This menu is used to access the context-sensitive online help and identify the Freedom EVOware version that you are using.

6.6.1 Contents

This option opens the first page of the context-sensitive help and selects the contents tab. Press F1 instead if you want information on the currently selected item or dialog box.

6.6.2 Index

This option opens the first page of the context-sensitive help and selects the index tab. Press F1 instead if you want information on the currently selected item or dialog box.

6.6.3 Using Help

This option opens a help page with brief instructions on using the context-sensitive help.

6.6.4 Error History

This option opens a dialog box with a list of the last 20 information or error messages which were displayed while using Freedom EVOware. In the case of error messages, the ID column shows the Error ID string (see 18.3 “List of Error Messages”, 🗎 18-32).

Double-click on an entry in the list to see more details of the message.

If required, users with the user level Administrator or Application Specialist can add more information to each message such as a reason and a possible solution. The user-defined texts are saved in Freedom EVOware and appear in future each time the message is displayed. See 18.2 “Editing Messages in Message Boxes”, 🗎 18-29 for more information.

6.6.5 Service Contact

This option opens a window with information on the service engineer who is responsible for supporting your Tecan hardware and software components. The contact information which shown on this page can be entered and/or edited using the IQ Wizard (see A.9.10 “IQ Wizard”, 🗎 A-55, Customer information).

6.6.6 About

This option shows information on the Freedom EVOware version which is installed, the available real memory and hard disk memory, Tecan copyright

information and the hardlock (dongle) ID. If there is no hardlock fitted, “Non upgradable hardlock” is shown.

Version information for the currently installed device drivers can be viewed using the Configuration Tool (see 8.4.1.1 “Device Information Tab”, 🗎 8-21).

It also shows the intended use of your Freedom EVOware configuration - general purpose applications or research use only. See 3.2 “Intended Use of the Freedom EVOware Software”, 🗎 3-3 for more information.

See 3.1 “Overview of Freedom EVOware”, 🗎 3-1 for an introduction to the Freedom EVOware software.

6.7 Freedom EVOware Toolbar

The toolbar gives you quick access to commonly used functions:

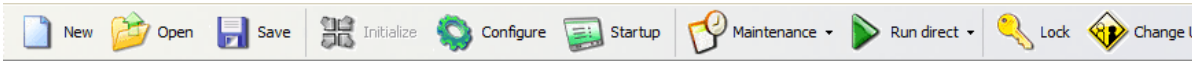


Fig. 6-10 *Toolbar*

New

See 6.1.1 “New”, 🗎 6-1.

Open

See 6.1.2 “Open”, 🗎 6-3

Save

See 6.1.3 “Save”, 🗎 6-5.

Initialize

This function is used to manually initialize the arms of the pipetting instrument. It also initializes all of the optional devices.

Each time Freedom EVOware or an Freedom EVOware script or process is started, the status of the instrument arms (LiHa, RoMa and PnP) and optional devices (e.g. Te-MO or Te-VacS) is checked and they are initialized if necessary. In addition, a full initialization sequence is carried out when Freedom EVOware is started for the first time after powering up the pipetting instrument.

Manual initialization is not normally necessary, but can be used as a quick check that the instrument is responding properly. When you use the Initialize function, Freedom EVOware determines automatically whether it is necessary to carry out a full or a partial initialization sequence.

See 8.4.2.8 “Arm Initialization”, 🗎 8-31 for more information.

Print

See 6.1.6 “Print”, 🗎 6-6.

Configure

See 6.5.3 “Configure”, 🗎 6-16.

Startup

See 6.1.7 “Start Up Wizard”, 🗎 6-7.

Maintenance

To run a maintenance script, click this button and choose the script from the pull-down list. See 6.4.2 “Run Maintenance”, 🗎 6-10.

Run

This button is used to run scripts and processes (see 12 “Running Scripts and Processes”, 12-1). Click the small black arrow to choose one of the three Run options from the pull-down list:

- **Run**: This option opens the Runtime Controller, where you can choose the required runtime settings before you run the script or process.
- **Run direct**: This option runs the currently loaded script or process immediately using the default settings of the Runtime Controller. In Freedom EVOware Plus, you can also choose from the pull-down list how many process instances (copies of the process) you want to run in parallel. For more information on process instances, see 12.2 “Running and Optimizing a Process (Freedom EVOware Plus)”, 12-5.
- **Recover**: This option is only available if the script or process was interrupted while it was running - for example due to a runtime error or because Pause was clicked - and did not execute completely. See 17.2 “ Script and process recovery function”, 17-5.

Lock

See 6.1.9 “Lock EVOware”, 6-7.

Change User

See 6.5.1 “Change User”, 6-15.

6.7.1 Toolbar Buttons for the Script Editor (Freedom EVOware Plus)

The following buttons are shown on the right side of the toolbar if you click on the Script Editor window:

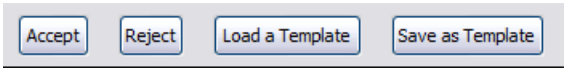


Fig. 6-11 *Toolbar buttons for the Script Editor*

Accept

Accept any changes you have made to the script, close the Script Editor and return to the Process Editor. To permanently save any changes you have made for future Freedom EVOware sessions, you must also choose Save in the File menu.

Reject

Reject any changes you have made to the script, close the Script Editor and return to the Process Editor.

Load a Template

Load an existing script template. Please note that the labware definitions are taken from the currently loaded process, and not from the script template. If you get script validation errors, open each line of the script and select the appropriate labware on the worktable.

Save as Template

Save the current script as a template. The file which is saved also contains configuration settings for Freedom EVOware, for example the positions of the devices and the labware in the Worktable Editor.

6.7.2 Toolbar Buttons for the Worktable Editor

The following button is shown on the right side of the toolbar if you click on the Worktable Editor window.

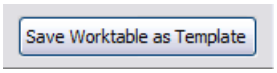


Fig. 6-12 *Toolbar button for the Worktable Editor*

Save Worktable as Template

Save the current worktable layout (the positions of the devices and the labware) as a template.

6.7.3 Status Bar

The status bar displays the following information:

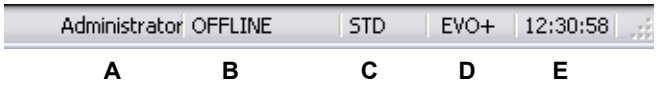


Fig. 6-13 *Status bar*

A	*User level*	***D***	*Dongle type*
B	*Operation mode*	***E***	*Clock*
C	*Feature* level		

The fields in the status bar are as follows:

User Level

This shows the level of the currently logged in user:

Administrator = Administrator
Specialist = Application Specialist
Operator = Power User

The Status Bar is not shown at all if you are logged in as Operator.

Operation Mode

This shows the operation mode as follows:
REAL MODE = Real mode (normal operation)
OFFLINE = Offline mode (previously called simulation mode).
3D SIMULATION = Freedom EVOware is connected to EVOSim (see A.14 “Configuring and Using the 3D Simulation Tool EVOSim”, A-103).

Freedom EVOware will run in offline mode if (a) you choose to start in offline mode - see A.6 “Command Line Parameters (Freedom EVOware)”, A-29 - or (b) Freedom EVOware cannot detect a hardlock and/or a pipetting instrument when it starts (see 5.1.4 “Instrument and Hardlock Detection”, 5-3). In offline mode, firmware commands such as movement commands are not sent to the pipetting instrument (i.e. pipetting does not take place).

Feature Level

This field shows the Freedom EVOware feature level:

STD = Freedom EVOware Standard
PLUS = Freedom EVOware Plus

Dongle Type

This field shows which type of hardlock (dongle) is fitted to your PC:

DEMO= No hardlock detected
EVO = Hardlock for Freedom EVOware Standard.
EVO+ = Hardlock for Freedom EVOware Plus.
EVO75 = Hardlock for Freedom EVOware Standard and Freedom EVO 75.
EVO75+ = Hardlock for Freedom EVOware Plus and Freedom EVO 75.
3D SIM = Freedom EVOware is being used with the 3D simulator EVOSim; a dongle is not required in this case.

The hardlocks EVO and EVO+ can be used for all supported pipetting instruments. The hardlocks EVO75 and EVO75+ can only be used for the Freedom EVO 75 pipetting instrument.

See also 3.1.2 “Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus”, 3-2.

Clock

This shows the current time as reported by the PC’s clock.

Note: *If a blinking message “Your software is not registered yet” is shown in the middle of the status bar, see A.9.11 “Registration Wizard”, A-63 for more information.*

7 Tecan User Management System

Freedom EVOware is a closed system and access to Freedom EVOware requires you to enter a user name and password. Please note that user names and passwords are case-sensitive. Contact your Freedom EVOware Administrator if you are authorized to use Freedom EVOware but do not have a user name and password. Some of the features in Freedom EVOware are only available if you have been given Freedom EVOware Administrator or Application Specialist access rights.

Note: *You can only change the settings for users and groups if you have been given Freedom EVOware Administrator access rights.*

The Tecan User Management system is a central software component which handles user log in and user authorization for all Tecan software components. It also provides facilities to log out users after a specified period of inactivity and to send warnings by eMail to a specified person (usually the Freedom EVOware Administrator) if an attempt is made to log in to the Tecan software using an invalid user name and password combination. Furthermore, users are disabled automatically after entering the password incorrectly a specified number of times consecutively.

To access the Tecan User Management system, click Configure in the toolbar to start the Configuration Tool. Then click the *General* tab and choose either *Users* or *Groups* in the User Management section (see 8.3.3 “User Management Section”, 🗎 8-16). You need to have Freedom EVOware Administrator rights to do this.

The Tecan User Management system does not rely on the MS Windows access rights and log in mechanisms which have been configured for your PC and/or for your local network. The Tecan User Management system thus provides an additional security barrier against unauthorized use of the Tecan software.

Freedom EVOware writes log files and audit trails and can create data files. It is important to correctly configure the MS Windows access rights to the respective directories on your PC and/or local network to prevent unauthorized access to and tampering with this data.

There are four different levels of access rights for the Freedom EVOware software: *Administrator*, *Application Specialist, Power User* and *Operator*. See 7.2 “Freedom EVOware Access Rights (User Levels)”, 🗎 7-3 for information on the user levels. After logging in, the user level is shown in the status bar at the bottom of the screen (see 6.7.3 “Status Bar”, 🗎 6-20).

When the Freedom EVOware software is started for the first time after being installed, you will be prompted to create a new user with Freedom EVOware Administrator rights. Try to develop a secure and effective way of remembering your password. To prevent access to the system by unauthorized persons, make sure that the Administrator log in is only known to the Freedom EVOware Administrator and to no-one else.

Users, groups and password rules are configured in Freedom EVOware’s Configuration Tool (see 8.3.3 “User Management Section”, 🗎 8-16). In addition, a tool is provided to import user information into the Tecan User Management System (user database) from vCard files (see A.9.12 “Import vCards Tool”, 🗎 A-68).

7.1 Main Features of the Tecan User Management System

The Tecan User Management system has the following main features:

- All changes relating to user management require Freedom EVOware Administrator access rights.
- All changes relating to user management are recorded in the user management audit trail.
- User accounts are automatically disabled following a configurable number of consecutive failed attempts to enter the correct user name and password combination. The disabled account can only be reactivated again by the Freedom EVOware Administrator.
- Freedom EVOware does not allow more than one person to use the software simultaneously.
- Users can log out without leaving Freedom EVOware or interrupting a running pipetting script or process. The same or a different user can then log in to Freedom EVOware again while the script or process is still running. See 6.1.9 “Lock EVOware”, 🗎 6-7.
- Users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected.
- User passwords expire after a configurable number of days. The user must then choose another password. The new password must be different from the old password.
- Passwords must contain a specified minimum number of characters.
- Passwords can be forced to contain numeric digits.
- Passwords cannot be reused.
- User names and user name and password combinations are unique within the system and cannot be assigned more than once.
- The Freedom EVOware Administrator provides a temporary password when setting up a user. When the new user first logs on to the system, he or she is forced to change to change the password immediately. This ensures that no one other than the individual user knows the particular user name and password combination.
- If a user forgets his/her password, the Freedom EVOware Administrator does not have access to the user’s password. The Freedom EVOware Administrator is only able to reset the password and provide a new temporary password.
- If the Freedom EVOware Administrator forgets his or her password, no one has access to the password.
- A specified person (typically the Freedom EVOware Administrator) can be automatically notified by eMail in case of potential security threats (e.g. a user account has been disabled after a configurable number of consecutive failed login attempts).

7.1.1 User Management Audit Trail

All changes relating to user management are recorded in the user management audit trail. A new file is written to the <install_path>\AuditTrail\Configuration directory each time you start and then exit the Freedom EVOware Configuration Tool. The file name is UserTrailYYYYMMDD_HHMMSS, where YYYYMMDD is the file creation date and HHMMSS is the file creation time.

7.2 Freedom EVOware Access Rights (User Levels)

Freedom EVOware provides four user levels with the following rights:

Tab. 7-1 *Access rights for operators, application specialists and administrators*

Operator	has rights to: • Run a pipetting script (Freedom EVOware Standard) or process (Freedom EVOware Plus) • Run maintenance scripts (see 6.4.2 “Run Maintenance”, 6-10) • View a pipetting script (but not change it) • Handle errors during pipetting Since operators are not allowed to create or modify scripts and processes, most of the program interface features are hidden or disabled.
Power user [a)]	same as **Operator** but with additional rights to: • Start running pipetting scripts at a specified line number. • Run direct commands (see 5.4.1.3 “Direct commands”, 5-10).
Application Specialist	same as **Operator** but with additional rights to: • Create, modify and save pipetting scripts (Freedom EVOware Standard and Freedom EVOware Plus) and processes (Freedom EVOware Plus) • Edit the configuration of the pipetting instrument • Edit the configurations of carriers and labware • Edit the liquid classes for pipetting • Change settings in the Freedom EVOware Configuration Tool • Skip pre-programmed timers during pipetting
Administrator	same as **Application Specialist** but with additional rights to: • Create and disable/re-enable users • Configure the options in the Tecan User Management system • Enable or disable the Electronic Signatures feature

a) Using the Configuration Tool, you can assign additional rights to the Power User for special applications. In addition, you can create additional user levels (user groups). See 8.3.3.3 “Groups Tab”, 8-20.

All four Freedom EVOware user levels need read/write access to the <install_path> directory and its subdirectories. The user level Operator cannot create or modify scripts or processes, but Freedom EVOware still needs read/write access to write log and export files and audit trail data.

Other Tecan software components such as Magellan have a different hierarchy of user levels. Please refer to the respective user manual for more information. The Tecan User Management system handles user authorization for all of the Tecan software components.

7.3 Special configuration options for the User Management System

The following features are intended for experienced systems administrators.

7.3.1 Freedom EVOware login using the Microsoft Windows login name instead of the Tecan user database

The Tecan User Management System can be configured to use the Microsoft Windows user database (with Windows login names) instead of the Tecan user database. This avoids the need to remember two different user names and passwords - one for Microsoft Windows and a different one for Freedom EVOware.

Since Freedom EVOware 2.1 SP2, the User Management System is implemented as a server which runs as a Windows service. The Tecan user management server normally manages users and groups using an encrypted XML database, but can be configured to use the Microsoft Active Directory user and groups database or the Windows local machine user database instead (in read-only mode).

If your company uses Microsoft Active Directory for managing users and groups and you have more than one Freedom EVOware system, this allows you to manage Tecan users and groups centrally for all of your systems.

Use the SwitchProvider tool to switch between using the Tecan user management database (encrypted XML file) and using the Windows user management database:

Fig. 7-1 *SwitchProvider tool*

To start the SwitchProvider tool, navigate to the directory C:\Program Files\Tecan\Tecan User Management\v1.1 using Windows Explorer and double-click on Tecan.UserManagement.SwitchProvider.exe.

Please exit Freedom EVOware before using this tool.

Windows Vista users: Windows administrator rights are needed to run this application.

The status of the radio buttons shows which of the two user management systems is currently being used by the Tecan software.

After switching to the Windows user database, user accounts for Freedom EVOware must be created, edited and deleted using Microsoft Active Directory or the User Accounts feature in the Windows Control Panel and no longer in the Configuration Tool of Freedom EVOware.

Run the tool again if you want to switch back to using the Tecan user database.

Tecan user groups and user roles

Windows users are assigned to roles (user groups) in Freedom EVOware by assigning them to specially created Windows groups using the following naming conventions:

Tecan_<evoware_group_name>

i.e. the string “Tecan_” is prefixed to the Freedom EVOware group name.

Tu run Freedom EVOware using a Windows login, you must be a member of at least one of these Windows groups (depending on the Freedom EVOware rights you require):

- Tecan_Administrators
- Tecan_Evoware_Application_Specialist
- Tecan_Evoware_Power User
- Tecan_Evoware_Operator

For information on user group names and rights in Freedom EVOware see 8.3.3.3 “Groups Tab”, 8-20.

7.3.1.1 How the SwitchProvider tool works

SwitchProvider works by modifying the XML configuration file Tecan.UserManagement.Server.exe.config as follows.

- The line <membership defaultProvider="XmlMembershipProvider"> is changed to <membership defaultProvider="WindowsMembershipProvider">
- The line <roles defaultProvider="XmlRoleProvider"> is changed to <roles defaultProvider="WindowsRoleProvider">
- The tool then re-starts the service Tecan.UserManagement.Server.exe.

The default location of Tecan.UserManagement.Server.exe.config is:

- Windows XP and Windows Vista: C:\Program Files\Tecan\Tecan User Management\v1.1\

7.3.1.2 Compatibility

This feature is not available for the Tecan User Management System concept which was used prior to Freedom EVOware 2.1 SP2 (former ERES system).

The ERES system is also used by Tecan Magellan software prior to version 6.5. If you want to use Freedom EVOware 2.1 or later and Magellan 6.4 or earlier, Magellan must be installed before you install Freedom EVOware. Magellan will then proceed to use the new user management server instead of ERES. If you install Freedom EVOware before Magellan, Freedom EVOware will revert to using the former ERES system.

This feature cannot be used together with the feature “Sharing the Tecan user management database in a network environment” (see 7.3.2, 7-5).

7.3.2 Sharing the Tecan user management database in a network environment

If you are running multiple Freedom EVOware installations which are connected together within the same LAN, you can configure the system to use a central user management database which can be shared by several pipetting instruments. This avoids having to set up Tecan users and groups separately on each of the PCs.

Since Freedom EVOware 2.1 SP2, the User Management System is implemented as a server which runs as a Windows service. The Tecan user management server manages users and groups using an encrypted XML database.

The XML database is normally located in a local directory of each Freedom EVOware installation as follows:

- Windows XP: C:\Documents and Settings\All Users\Application Data\Tecan\Tecan User Management\v1.1
- Windows Vista: C:\ProgramData\Tecan\Tecan User Management\v1.1\

Proceed as follows to share the user management database:

- Choose the Freedom EVOware installation whose XML database you want to share
- Right-click the directory containing the XML database, click Properties and click the Sharing tab. Then share the directory which contains the XML database with other network users and assign a share name. See the MS Windows documentation for more information on network sharing.
- Still in Properties, click the Security tab and assign read/write permissions to this directory for the system account of all of the remote Freedom EVOware installations.
  - Note: On the local system, the system account of each remote system is normally the host name of the remote system.
  - Note: On the local system, Tecan.UserManagement.Server.exe runs as a Windows service under the local account SYSTEM.

On all of the Freedom EVOware installations except for the installation whose XML database you want to share - reconfigure the Tecan user management server to use the shared directory:

- Click Start, choose Run, enter cmd and click OK.
- In the console window, navigate to the directory of the Tecan user management server:
  - Windows XP and Windows Vista: C:\Program Files\Tecan\Tecan User Management\v1.1\
- Type in "Tecan.UserManagement.Server.exe /xmlPath:"\\servername\sharename\UserManagement.xml"

  Where server name is the host name of the PC with the shared XML database and sharename is the name you chose for the network share.
- The Tecan user management server is then permanently configured to use the shared XML file instead of the local XML file
- To revert back to using the local file, use the following console string instead: "Tecan.UserManagement.Server.exe /xmlPath:localpath"

  Where localpath is:
  Windows XP: C:\Documents and Settings\All Users\Application Data\Tecan\Tecan User Management\v1.1
  Windows Vista: C:\ProgramData\Tecan\Tecan User Management\v1.1\

Contact Tecan if you need further information on implementing this feature.

7.3.2.1 Compatibility

Users and groups cannot be edited by more than one of the Freedom EVOware installations simultaneously.

This feature cannot be used together with the feature “Freedom EVOware login using the Microsoft Windows login name” (see 7.3.1, 🗎 7-4).

See also 7.3.1.2 “Compatibility”, 🗎 7-5.

8 Configuration Tool

This chapter describes how to use Freedom EVOware's Configuration Tool to configure general settings for Freedom EVOware. The Configuration Tool also allows you to configure settings for the liquid handling arm, instrument options and optional devices and to set up Freedom EVOware users and groups.

The Configuration Tool is started by clicking Configure in the Freedom EVOware toolbar. The Configuration Tool has two main tabs, Instrument and Devices.

You can also start the Configuration Tool by clicking the Start button in the Windows task bar and choosing All Programs > Tecan > EVOware > Configure.

You will be prompted to enter your Freedom EVOware user name and password.

Note: *You can only use the Configuration Tool if you have been given Freedom EVOware Administrator or Application Specialist access rights. You can only change the settings for users and groups if you have been given Freedom EVOware Administrator access rights.*

Note: *Liquid classes are configured with the Liquid Classes Editor, not with the Configuration Tool (see 10 "Configuring Liquid Classes", 10-1).*

8.1 Toolbar Buttons and Menus

8.1.1 Toolbar Buttons

The toolbar gives you quick access to commonly used functions:

Fig. 8-1 *Toolbar and menus, Configuration Tool*

Exit

This function is used to exit the Configuration Tool.

Save

This function saves the configuration changes you have made.

Undo

This function undoes the configuration changes you have made (it resets your changes to the settings which were last saved). It only resets the changes for the currently selected page.

Backup

This function is used to back up the Freedom EVOware configuration and data files (including scripts and processes). See 8.2 "Backing Up and Restoring Your Configuration", 8-3.

The Backup function is not available when Freedom EVOware is running (start the Configuration Tool on its own with Start > All Programs > Tecan > EVOware > Configure).

Restore

This function is used to restore a previously made backup of the Freedom EVOware configuration and data files. A dialog box is shown to allow you to choose which backup version you want to restore. All existing configuration and data files will be overwritten.

The Restore function is not available when Freedom EVOware is running (start the Configuration Tool on its own with Start > All Programs > Tecan > EVOware > Configure).

Help

This function opens the help page for the currently selected tab. You can also get help for the currently selected tab by pressing F1.

8.1.2 File Menu

Backup

This function is used to back up the Freedom EVOware configuration and data files (including scripts and processes). See 8.2 “Backing Up and Restoring Your Configuration”, 8-3.

The Backup function is not available when Freedom EVOware is running (start the Configuration Tool on its own with Start > All Programs > Tecan > EVOware > Configure).

Restore

This function is used to restore a previously made backup of the Freedom EVOware configuration and data files. A dialog box is shown to allow you to choose which backup version you want to restore. Existing configuration and data files will be overwritten.

The Restore function is not available when Freedom EVOware is running (start the Configuration Tool on its own with Start > All Programs > Tecan > EVOware > Configure).

Save changes

This function saves the configuration changes you have made.

Exit Configuration Tool

This function is used to exit the Configuration Tool.

8.1.3 Edit Menu

Undo changes on this page

This function undoes the configuration changes you have made (it resets your changes to the settings which were last saved). It only resets the changes for the currently selected page.

8.1.4 View Menu

Status bar

This function is used to show or hide the status bar.

8.1.5 Help Menu

Show help for this page

This function opens the help page for the currently selected tab. You can also get help for the currently selected tab by pressing F1.

About

This function shows information on the Configuration Tool version which is installed, the available real memory and hard disk memory and Tecan copyright information.

8.2 Backing Up and Restoring Your Configuration

The Backup function is used to back up the Freedom EVOware configuration and data files (including scripts and processes) to a specified directory.

Freedom EVOware creates a new sub-directory in the specified directory for each backup. The name of the new sub-directory is BACKUP_YYYYMMDD_HHMMSS, where YYYYMMDD is the date and HHMMSS is the time of the backup. The default backup directory is <install_path>\Backup. See 8.3.1.4 “Protocol Options Tab”, 8-8 for information on specifying a different backup directory. You can also choose a network directory.

The Restore function is used to restore a previously made backup of the Freedom EVOware configuration and data files. A dialog box is shown to allow you to choose which backup version you want to restore. Existing configuration and data files will be overwritten.

The backup and restore operations are reported in the Freedom EVOware trace file.

Saving Audit Trail Data

If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files. These files are located in the <install_path>\AuditTrail directory. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See A.9.6 “Audit Trail Archiving tool”, A-47 and B “Appendix B - FDA 21 CFR Part 11 Compliance”, B-1.

8.2.1 Making an External Backup

To make an external backup of your configuration and data files, configure Freedom EVOware to use a network directory for backing up. Alternatively, make a local backup and copy the sub-directory containing the backup files to another PC, to your backup device or to a network directory.

8.2.2 Copying Scripts and Processes Between Different Pcs

Instead of using the backup and restore functions, you can copy scripts and processes between Freedom EVOware installations on different PCs using the Export Import tool (see A.9.4 “Export/Import Tool”, A-38).

8.3 General Settings

Click the *General* tab to view or edit the instrument settings. This group of settings allows you to configure general settings for Freedom EVOware, eMail notifications and the Tecan User Management system.

8.3.1 General Section

This section is used to configure general settings for Freedom EVOware.

8.3.1.1 Timeouts Tab

Timeouts panel

The *Initialization* and *Shutdown* fields let you specify the maximum duration of the initialization and shutdown procedures. An error message will be output if initialization and/or shutdown is not completed within the specified times. Specify the times in seconds.

Delay panel

When running in offline mode, Freedom EVOware Standard highlights the currently active pipetting command and pauses for a specified time before executing the next command. The pause serves to optimize the visualization effect. Specify the required duration of the pause.

8.3.1.2 Pause Tab

Specify whether you want to globally enable or disable the system pause. You can also specify an interval during which the system is not allowed to pause due to an error. For example, you may want to prevent a system pause during the night when the system cannot be manually restarted.

8.3.1.3 Scheduler Tab

The settings in the Scheduler tab are only relevant for Freedom EVOware Plus.

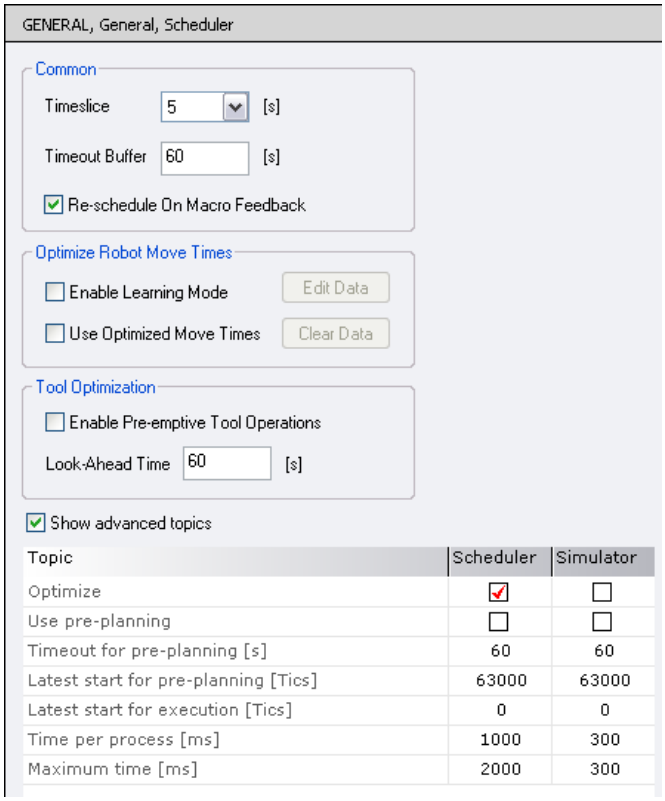


Fig. 8-2 *Configuring the Scheduler*

Common panel

Timeslice

The *Timeslice* field specifies the smallest unit of time (scheduling tick) which the scheduler should use to calculate and optimize processes. With the default setting of 5 seconds, the scheduler checks every 5 seconds whether rescheduling is possible or necessary. Increasing this value will speed up the scheduling process whereas lower values may increase the throughput of the process (e.g. microplates per hour).

Note: *The scheduler can handle a maximum of 65,000 timeslices. The maximum runtime is then roughly 90 hours with a timeslice setting of 5 seconds. If necessary, the system specialist can increase the maximum number of timeslices for advanced applications.*

Timeout Buffer

This field lets you specify how many seconds the system should wait before triggering a timeout. A larger value gives the system more time to potentially solve the problem that caused the timeout before stopping the system.

Example: If timeout buffer = 60 seconds and the expected duration of the command is exceeded, a system pause is requested and the timeout buffer of 60s is started. If the command completes within the 60s, the system resumes and the timeout buffer is reset to 60 s. If the command does not complete within 60s, a timeout is triggered and an error message is output. The other actions which are then taken depend on the situation.

Keep in mind that RoMa move times can vary significantly because of interaction with pipetting operations (the arm collision avoidance algorithms give a higher priority to LiHa movements than RoMa movements once pipetting has started and until a wash or drop DiTi command is reached). Especially if you use close-fitting or optimized move times, the timeout buffer setting should be large enough to allow for possible RoMa movement delays.

Re-schedule on macro feedback

With the default setting of the Timeslice parameter, the scheduler checks every 5 seconds for completion messages from internal Freedom EVOware commands (macros) and will reschedule the macros and the associated process if they have completed faster than expected. Check this checkbox if you want the scheduler to re-schedule as soon as possible without waiting for the timeslice to complete. This can improve the performance (throughput) of the process.

Optimize Robot Move Times panel

Enable learning mode

If you enable this feature, information is stored on the actual times required by robot moves (RoMa moves, MCA96 gripper and MCA384 CGM moves, move times of external robots, pre/post actions but not PnP moves) each time you run a process. If you also check the *Use time fit information* checkbox, the scheduler interprets the stored information when you run the process again. This allows the scheduler to plan the process more accurately in future and to optimize the throughput.

This is similar to making a calibration run, but you only need to run a single process instance to get meaningful data. The stored information becomes increasingly accurate and thus more beneficial the more times the process is run.

Click *Edit Data* if you want to edit the stored time information manually. In the editing window, each section (e.g. [Hotel_9Pos_Microplate]) refers to the starting point of a robot move. The entries within the sections list the destinations of the robot move (e.g. MP_3Pos). The eight numeric parameters are as follows:

- Move type 1: Time required for normal move (the labware has no lid or the labware is moved together with the lid)
- Move type 2: Time required to remove the lid from the labware
- Move type 3: Time required to put back the lid on the labware
- Move type 4: Time required to move the labware and the lid separately (the labware and the lid are put down at different locations)
- Number of moves recorded for move type 1 (do not edit)
- Number of moves recorded for move type 2 (do not edit)
- Number of moves recorded for move type 3 (do not edit)

– Number of moves recorded for move type 4 (do not edit)

All times are in seconds. Both “time required” and “number of moves” are zero if this move type has not taken place during the learning phase. The accuracy of the time measurement increases with an increasing number of moves during the learning phase.

Use optimized move times

Check this checkbox if you want the scheduler to interpret and use information which has been stored on the actual times required by robot moves. If you activate this option, make sure that the setting for timeout buffer is long enough (see Timeout Buffer, above, for more information).

Click *Clear Data* to delete the stored information. You should do this e.g. if you have edited or optimized a RoMa vector, for example by re-designing it to use less waypoints. You then need to re-enable learning mode again.

Tool Optimization panel

Enable pre-emptive tool operations

Check this checkbox if you want Freedom EVOware to check the process for device commands which are soon due for execution (look ahead). Depending on the device type and the command, this allows Freedom EVOware to send preparatory instructions to the device to speed up the execution of the command.

For example, the carousel can be instructed to bring the next labware item to be processed from the carousel tower to the transfer position, where it can wait for a subsequent fetch command (RoMa movement). The RoMa then does not have to wait for the labware to be brought from the tower. This optimizes the movement times for the carousel.

Pre-emptive tool operations are only available for the carousel and some third-party incubators.

Look ahead time

Specify how far ahead the scheduler should check the process for device commands which can be optimized in this way. The time you specify should be about the same time which is required for the preparatory instructions (e.g. about the same time which is required to bring the labware from the carousel tower to the transfer position).

Very long times can increase the risk of unnecessary unloading of labware from the carousel due to changes in the schedule. This will result in time wastage since the unloaded labware has to be put back in the carousel tower before another labware item can be brought.

If the location is an incubator, keep in mind that pre-emptive tool operations can affect the incubation time specified in the process if the look ahead time is longer than necessary, since the labware could be removed from the controlled environment earlier than necessary.

The look ahead time you specify here is a global setting. See 8.4.4.4 “Pre-emptive Tool tab”, 8-38 for information on specifying the look ahead time individually for each optimizable device command.

Show advanced topics

Check this checkbox if you want to make more detailed settings for the scheduler and the simulator. The first three topics below are always available:

Optimize

If you enable optimization for the scheduler, the resource reservations for the process will be optimized dynamically if a command finishes earlier than planned. The default setting for the Scheduler is “enabled”. The default setting for the Simulator is “disabled” and should not be changed.

Use pre-planning

Check the respective checkboxes to enable or disable pre-planning for the scheduler and/or the simulator. If pre-planning is enabled, the system will use more time and schedule more processes during the first scheduling tick before the pipetting instrument starts to operate. This allows more exact forecasting of the process timing but reduces flexibility for dynamic planning. The default setting is “disabled” for both scheduler and simulator.

Timeout for pre-planning

Specify the maximum amount of time in s which the system will wait before starting process execution, regardless of how many processes have been scheduled so far. This setting is only relevant if you are using pre-planning.

Latest start for pre-planning / Latest start for execution

These fields specify the maximum amount of time in scheduling ticks between making resource reservations for a process and starting it. The settings affect how much advanced planning will be carried out and are important for rescheduling a process. The scheduling is more dynamic if you choose a lower value. *Latest Start for pre-planning* is used during the pre-planning phase (before scheduling starts) whereas *Latest Start for execution* is used as soon as the execution phase begins.

Time per Process

Maximum time in ms which is given to the scheduler to make reservations for one process during the current planning tick (timeslice). You should choose a value which is much shorter than one timeslice.

Maximum Time

Maximum time in ms which is given to the scheduler to make reservations for all processes during the current planning tick (timeslice). You should choose a value which is shorter than one timeslice.

8.3.1.4 Protocol Options Tab

This is used to configure the paths which Freedom EVOware uses to store output, backup and log files.

System path

This non-editable field shows the Freedom EVOware installation path. See A.5 “Freedom EVOware Directory Structure and Files”, A-25 for more information on the Freedom EVOware directory structure and file names.

Output panel

Specify the directory which should be used for output files from the Export Data and PosID commands. Enter the path directly or click Browse and choose the required directory. You can also choose a network directory.

Backup panel

Specify the directory which should be used to store backup copies of the Freedom EVOware configuration and data files. Enter the path directly or click Browse and choose the required directory. You can also choose a network directory.

Freedom EVOware creates a new sub-directory in the specified backup directory for each backup. See 8.2 “Backing Up and Restoring Your Configuration”, 8-3 for more information.

Log Options panel

Freedom EVOware writes log files to document the pipetting, to record user actions, to help you to check scripts in offline mode and to find errors. In addition, it writes audit trail data and a trace file. The log files and the trace file are written to the c:\program files\Tecan\EVOware\AuditTrail\Log directory.

Freedom EVOware always writes log files of type EVO. The information which is logged can also be viewed in the Tecan/EVOware/Log channel of the LogViewer tool (see A.10 “LogViewer Tool”, A-72).

Freedom EVOware users with Administrator or Application Specialist rights can activate two additional log file types (User and/or Error) with different levels of logging detail, either individually or in combination:

– Check the Input checkbox to write log files of type USR. The information which is logged can also be viewed in the Tecan/EVOware/Usr channel of the LogViewer tool.
– Check the Error checkbox to write log files of type ERR. The information which is logged can also be viewed in the Tecan/EVOware/Error channel of the LogViewer tool.

See A.1 “Overview of the Log Files”, A-1 for more information on these log file types.

You can also view recent log entries by choosing *Log Window* in the *View* menu. The Log Window has the same contents as the log file of type EVO and initially shows the last 1000 log entries.

Note: *Freedom EVOware can output a large amount of logging information. It is recommended to back up and then delete the old log files on a regular basis. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See A.9.6 “Audit Trail Archiving tool”, A-47.*

Evaluate Checksums

Freedom EVOware uses a checksum system which is based on a CRC algorithm to protect configuration, script, trace and log files. The checksum is a computed value which is used to detect corrupted or otherwise altered data. It is also able to detect whether files have been modified outside of Freedom EVOware by another program or process.

A warning is shown if an attempt is made to load a file with an incorrect or missing checksum. The user can then choose to load the file or cancel. In the latter case, Freedom EVOware aborts with the exception of script files. In this case, the file is not loaded but Freedom EVOware remains running. An entry is written to the log file each time an incorrect or missing checksum is found.

Uncheck the *Evaluate file checksums* checkbox if you want to disable the warning (you need Freedom EVOware Administrator rights to change this setting). You should not disable this feature if you need to comply with the FDA regulations (see B “Appendix B - FDA 21 CFR Part 11 Compliance”, B-1).

The Data Explorer can be used to check whether Freedom EVOware configuration and data files have valid checksums (see A.9.1 “Data Explorer Tool”, A-35).

Log Serial Data

Check the *Log serial data* checkbox to include serial data (instrument firmware commands) in the EVOware/Log channel of the LogViewer tool. This will significantly increase the amount of data which is logged. The firmware commands are marked with an “F” in the log files. See A.1 “Overview of the Log Files”, A-1 for more information.

The serial data can be useful when investigating communication errors. The log file also includes firmware commands for devices which are connected to the instrument’s CAN bus (e.g. LiHa, RoMa, PnP, incubator(s), Te-Shake, Te-MagS, Te-VacS and Te-Stack). It does not include firmware commands for devices which have their own RS232 interface.

To avoid logging an excessive amount of data, this logging feature should be disabled when it is not needed.

See 8.4.3.2 “Logging Option”, 8-36 for information on log files for devices which have their own RS232 interface.

Electronic signatures

If you check the *Electronic Signatures* checkbox, users will be forced to enter a comment to explain the reason when carrying out one of the following actions:

- Creating, deleting or editing script files and script templates
- Creating, deleting or editing process files and process templates
- Creating, deleting or editing worktable templates
- Creating, deleting or editing carrier definitions
- Creating, deleting or editing labware definitions
- Creating, deleting or editing liquid classes
- Making changes to configuration settings
- Creating, deleting or editing users, groups and password rules

This feature helps to identify why the user performed a specific action. This feature can only be activated or disabled by a user with Freedom EVOware Administrator rights.

The Electronic Signatures feature also requires the currently logged in user to enter his or her Freedom EVOware password each time one of the above actions are carried out:

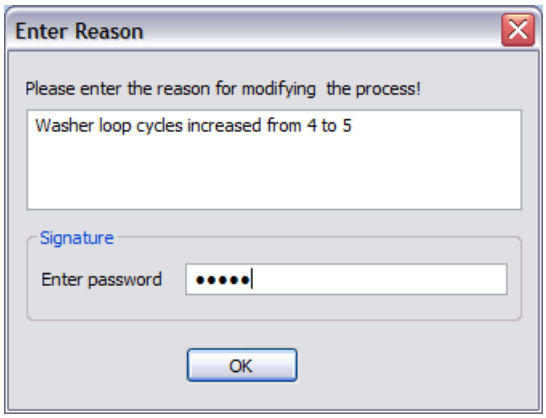


Fig. 8-3 *Password prompt when the Electronic Signatures feature is active*

The user comment for each of the above files can be viewed in the Data Explorer (see A.9.1 “Data Explorer Tool”, A-35). Only the most recent comment is saved. Earlier comments are stored with earlier versions of these files, which are automatically backed up to the <install_path>\AuditTrail\Configuration directory (see A.5 “Freedom EVOware Directory Structure and Files”, A-25).

If one of the above files has been modified automatically by Freedom EVOware, a comment is inserted which starts with “EVOware:”.

The Electronic Signatures feature also requires the currently logged in user to enter his or her password if errors occur when running a script or process. The user name and the errors will be recorded in the Freedom EVOware log files.

Audit Trail Archiving panel

The Audit Trail Archiving tool (AuditArch) allows you to archive Freedom EVOware log files and audit trail data either manually or automatically.

Start AuditArch at EVOware startup

Check this checkbox if you want AuditArch to archive the log files and the audit trail data automatically. AuditArch will then start in the background each time you start Freedom EVOware and archive the log files if this is required by the currently configured archiving actions.

Archiving Settings

Click this button to specify the required archiving actions. This opens the AuditArch dialog box:

See A.9.6 “Audit Trail Archiving tool”, A-47 for more information.

PMP Data panel

Pressure Monitored Pipetting is a hardware option for the liquid handling arm that monitors the pressure in the airgap between the sample and the system liquid during aspiration and dispensing. PMP is only available for 200 µl and 1000 µl LiHa DITI tips. Specify the directory to use for storing PMP evaluation configuration data and pressure curves.

The default setting is as follows:
C:\Program Files\Tecan\EVOware\PMP\ (Windows XP) or
C:\ProgramData\Tecan\EVOware\PMP\ (Windows Vista).

8.3.1.5 Collision Avoidance Tab

This is used to configure the settings for collision avoidance.

Enable parallel movement

Before moving a robot arm (LiHa, RoMa, MCA etc.) to a new position, Freedom EVOware checks whether it could collide with another arm during the movement and moves the other arm aside to make space. Check this checkbox if you want to allow the first arm to start its movement before the other arm has moved fully aside.

Movement delay

Specify how long the first arm should wait before starting its movement (default: 200 ms). You should allow enough time for the other arm to move aside before the first arm reaches its destination position.

8.3.2 Notifications Section

Freedom EVOware can be configured to send notification messages about system events and error situations to specific groups of users and/or write them to log files. When you configure this feature for the first time, we recommend you to configure the users and log files first, then the groups and finally the notifications. The users and groups for the notification feature are independent of the users and groups that you configure in the User Management section.

The Notifications feature requires either the MAPI service or access to an SMTP server (mail server). MAPI is included with many eMail programs, e.g. Microsoft Outlook.

The groups which you configure here are also used by the script commands “Notification” (see 15.51 “Notification Command”, 🗎 15-116) and “Tip Alignment Check” (see 15.20 “Tip Alignment Check Command”, 🗎 15-30).

8.3.2.1 Settings Tab

This tab is used to configure the eMail settings for the notifications feature.

Note: *If you expect to receive replies to the notification eMails, make sure that you configure an eMail program on another PC to receive the replies. Freedom EVOware does not provide facilities to receive eMails.*

Send User Notifications

Check this checkbox to enable the eMail notifications feature. If you disable this feature, this does not delete the eMail settings and you can re-enable them later if required.

MAPI, SMTP

Click the radio buttons to choose whether to send the notifications via MAPI or SMTP.

MAPI panel

The settings in this panel are only needed if you want to send the notification eMails using MAPI.

MAPI Profile

Specify the MAPI profile you want to use for sending the notification eMails. You can get a list of available profiles by double-clicking the Mail button in the Windows Control Panel. The Mail button will only be present in the Control Panel if you have installed the MAPI service. MAPI is included with many eMail programs such as Microsoft Outlook.

MAPI Password

Specify the password for the MAPI profile.

SMTP panel

The settings in this panel are only needed if you want to send the notification eMails using SMTP.

Server

Specify the address of the SMTP server you want to use for sending the eMails. You should normally specify the SMTP server address which is recommended by your eMail provider or eMail administrator.

Port

Specify the SMTP port number (default 25).

Sender Mail

Specify the required eMail address of the sender. It is recommended to choose an address which allows the Freedom EVOware PC to be easily identified in the eMail which is sent (e.g. “EVO_room2@mycompany.com”). Alternatively, you can specify the Windows host name of the PC (e.g. “PC185@mycompany.com”).

Sender Host

Specify the name of the eMail domain which you want to use for sending the notification eMails. This is normally the host name part of the eMail address in the Sender Mail field (the part after the “@” character, e.g. “mycompany.com”).

Timeout

Specify the maximum duration of the SMTP send mail command in ms. An error message will be output if the notification eMail could not be sent within this time.

Log File

Specify the file name and path of a optional log file which records the sending of eMail notifications via SMTP. The log file feature is mainly intended for debugging, e.g. to check that the eMails have been sent correctly.

Authentication

Check this checkbox if the SMTP server (mail server) requires authentication to allow eMails to be sent. This is normally the case.

User

Specify the user name for SMTP authentication.

Password

Specify the password for SMTP authentication.

The user name and password for SMTP authentication depends on the SMTP server. In most cases, it is the same user name and password which is used to collect eMails using the POP3 protocol. With some eMail providers, the user name is the same as the eMail address.

8.3.2.2 Notifications Tab

The following window is used to configure the notifications:

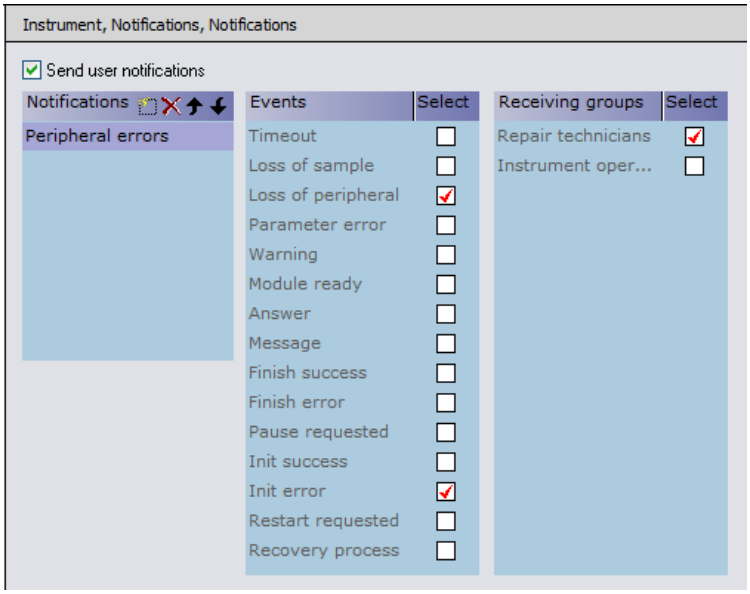


Fig. 8-4 *Notifications*

Click + in the Notifications panel to add a new notification. Then enter a descriptive name for the notification. You can change the name later if required.

The Events panel shows all of the system events which are available for the notification feature. Check the events which you want to include in this notification. The Receiving groups panel shows the notification groups which you have defined (see 8.3.2.3 “Groups Tab”, 8-15). Check the groups which should receive this notification.

Click to delete the currently selected entry. Click or to change the sort order of the entries in the list.

The E-mail panel is used to configure the e-mail message that you want to send for this notification:

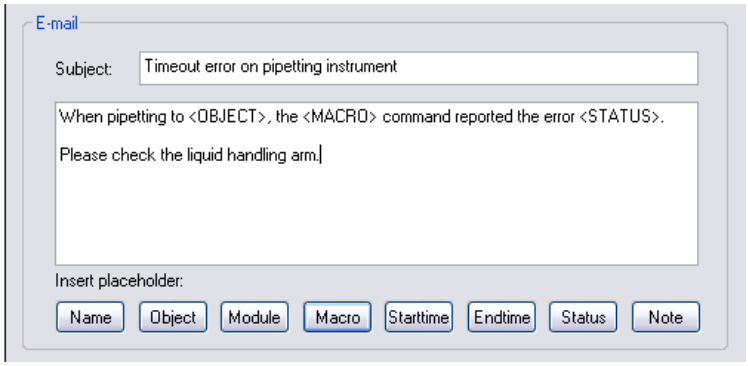


Fig. 8-5 *Notification e-mail*

Enter a subject for the e-mail that will be created in the Subject field. Then enter the message text for the for the e-mail. Click the buttons if you want to include placeholders for system variables in the message text. They will be dynamically replaced with their current values when the message is created.

The available placeholders are as follows:
<NAME>
The name of the current action.
<OBJECT>
The current object (normally a labware item)
<MODULE>
The device driver which producing the error.
<MACRO>
The EVOware command currently being executed.
<STARTTIME>
The starting time of the current command.
<ENDTIME>
The finishing time of the current command.
<STATUS>
The status of the current command (i.e. the error message).
<NOTE>
Any notes the command writes to trace files.

Note: *The placeholders referring to commands will only produce meaningful information if the system event is related to the execution of a command.*

If your recipients list for this notification includes a log file, when the notification e-mail is created during system runtime the same message will be written to the log file.

8.3.2.3 Groups Tab

Freedom EVOware can be configured to send notification messages about system events and error situations to specific groups of users and/or write them to log files. The following window is used to configure recipient groups for the notification feature:

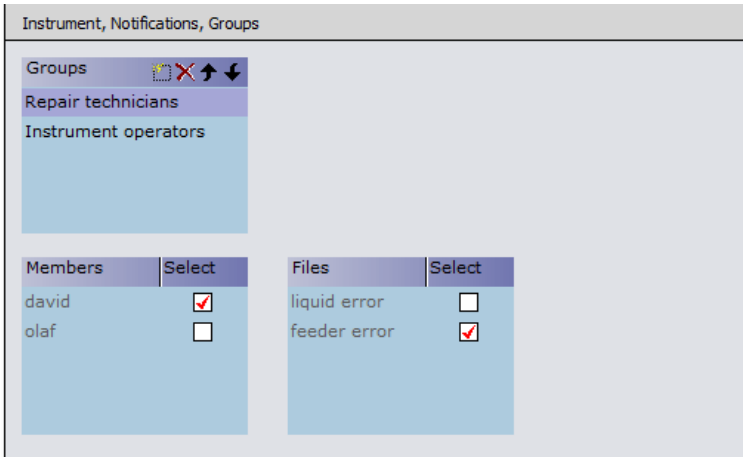


Fig. 8-6 *Groups for notifications*

Click + in the Groups panel to add a new group for the notification feature. Then enter a descriptive name for the group. You can change the name later if required. Click to delete the currently selected entry. Click or to change the sort order of the entries in the list.

The Users and Files panels show all users and files that you have configured under Recipients. Check the checkboxes alongside the users and files which should receive notifications for the currently selected group. Repeat this for all of the groups you have defined.
The users and groups for the notification feature are independent of the users and groups that you configure under User Management.

8.3.2.4 Recipients Tab

Freedom EVOware can be configured to send notification messages about system events and error situations to specific groups of users and/or to write the notification messages to log files. The following window is used to configure recipients for the notification feature:

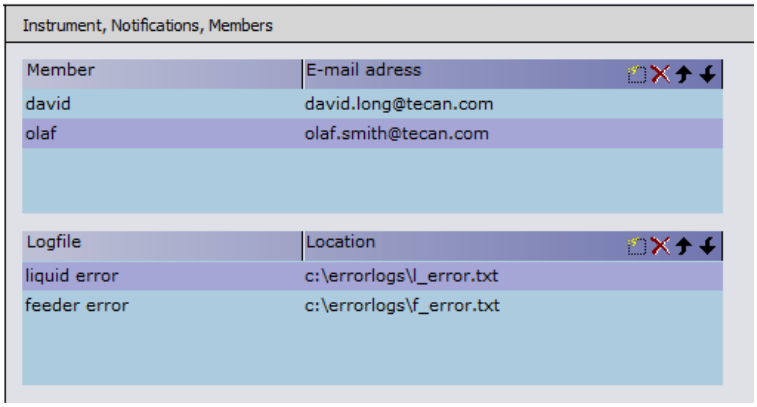


Fig. 8-7 *Recipients for notifications*

Click + in the User panel to add a new e-mail recipient for the notification feature. Then enter the recipient's full name and e-mail address. You can change the entries later if required.
Click to delete the currently selected entry. Click or to change the sort order of the entries in the list.

Click + in the LogFile panel to add a new log file for the notification feature. Then enter a descriptive name for the file and the filename (including the full path).
Click to delete the currently selected entry. Click or to change the sort order of the entries in the list.
The users and groups for the notification feature are independent of the users and groups that you configure under User Management.

8.3.3 User Management Section

Freedom EVOware is a closed system and access to Freedom EVOware requires you to enter a user name and password. The Tecan User Management system is a central software component which handles user log in and user authorization for all Tecan software components.
The User Management section in the Configuration Tool is used to set up the users who are authorized to use the Tecan software and to configure user groups. The security features of the User Management system are described in 7 "Tecan User Management System", 7-1.

All changes relating to user management are recorded in the user management audit trail (see 7.1.1 “User Management Audit Trail”, 7-2).

Note: *You can only change the settings for users and groups if you have been given Freedom EVOware Administrator access rights.*

When the Freedom EVOware software is started for the first time after being installed, you will be prompted to create a new user with Freedom EVOware Administrator rights. We recommend you to create one additional user with Freedom EVOware Administrator rights in case you need to access the user management and the normal system administrator is not available.

To prevent access to the system by unauthorized persons, make sure that the Freedom EVOware Administrator password is only known to the system administrator of the Tecan software and to no-one else. Try to develop a secure and effective way of remembering your password. Please note that user names and passwords are case-sensitive.

8.3.3.1 Settings Tab

This tab is used to configure settings for the user management.

Security panel

Lock application after x minutes idle time

Users are automatically logged out of Freedom EVOware after a specified time during which no keyboard or mouse-click activities have been detected. Specify the required time interval (range: 1 minute to 24 hours). Logged out users must log in to Freedom EVOware again to regain control of the program.

Exit after x unsuccessful logins

User accounts are automatically disabled after a configurable number of consecutive failed attempts to enter the correct user name and password combination. In addition, an optional security alert eMail can be sent to the Freedom EVOware Administrator (see below). Specify the required maximum number of unsuccessful logins (range: 1 to 10).

Enable file validation

All Freedom EVOware scripts and processes must be validated for correct functioning and for correct results and approved by the application specialist before they are used for pipetting with real samples (see C “Validation of Freedom EVOware Applications”, C-1). Check this checkbox if you want to hide non-validated scripts and processes from users with the access level *Operator* to ensure that they cannot use them.

If you check this checkbox, non-validated scripts, processes and templates are shown to Freedom EVOware Administrators and Application Specialists in the Selection dialog box with a gray icon instead of a green icon (they are not visible at all to Operators).

Deactivate user management

Check this checkbox if you want to deactivate user management. You can only change this setting if you have been given Freedom EVOware Administrator access rights.

With user management disabled, it is not necessary to enter a user name or password when Freedom EVOware is started, and all users will be given Freedom EVOware Administrator access rights automatically. Be aware of the security risk if you deactivate user management and make sure this is permitted by the security procedures of your laboratory or company.

Validate files on saving

Check this checkbox if you want the file status of the script or process to be automatically set to Approved when the file is saved.

Password panel

Minimum size of password x characters

Passwords can be forced to contain a specified minimum number of characters. Specify the required number of characters.

Passwords must contain numeric characters

Check this checkbox if passwords should contain one or more numeric characters.

Passwords expire after x days

User passwords expire after a configurable number of days. The user must then choose another password. Specify the required number of days (range: 1 to 365 days).

E-mail panel

A specified person (typically the Freedom EVOware Administrator) can be automatically warned by eMail in case of potential security threats (i.e. a user account has been disabled after a configurable number of consecutive failed login attempts). This panel is used to configure the settings for the eMail warnings.

Note: *If you expect to receive replies to the warning eMails, make sure that you configure an eMail program on another PC to receive the replies. Freedom EVOware does not provide facilities to receive eMails.*

Notification via e-mail

Check this checkbox if you want Freedom EVOware to send security warnings by eMail. If you disable this feature, this does not delete the eMail settings and you can re-enable them later if required.

Address

Specify the eMail address of the recipient (e.g. the system administrator).

The eMail warnings can be sent using either SMTP or MAPI:

Send with SMTP

Server: Specify the address of the SMTP server you want to use for sending the eMails. You should normally specify the SMTP server address which is recommended by your eMail provider or eMail administrator.

Send with MAPI

Profile: Specify the MAPI profile you want to use for sending the warning eMails. You can get a list of available profiles by double-clicking the Mail button in the Windows Control Panel. The Mail button will only be present in the Control Panel if you have installed the MAPI service. MAPI is included with many eMail programs, e.g. Microsoft Outlook.

Password: Specify the password for the MAPI profile.

Language panel

Choose the required user interface language for the runtime controller and other software components which are accessible to the operator of the pipetting instrument. The user interface of the Configuration Tool and parts of the Freedom EVOware software which are only accessible to the application specialist and/or system administrator are always shown in English.

8.3.3.2 Users Tab

The top panel on the right lists all users who are currently known to the Tecan software. The bottom panel lists all available user groups and shows the groups to which the currently selected user belongs. Check or uncheck the *Select* checkboxes to change the group assignments as required. Users inherit the rights of the groups to which they belong.

You do not need to assign users with Administrator rights to any groups since they automatically have all rights for the Tecan software. Accordingly, the bottom panel with the list of groups is hidden if you select a user with Administrator rights.

Check the *Admin* checkbox if you want to assign Administrator rights for Freedom EVOware to the currently selected user. The user is then authorized to use the Tecan User Management system to modify the settings for users and groups (see 7.2 “Freedom EVOware Access Rights (User Levels)”, 7-3).

Uncheck the *Enable* checkbox if you want to temporarily disable the log in for the selected user, for example during a holiday period. Never uncheck all of the *Enable* checkboxes because you will not be able to log in to Freedom EVOware again. We do not recommend you to disable the Freedom EVOware Administrator login.

Click in the Password field and then click ... if you want to change the password of the currently selected user. This opens the Enter New Password dialog box. The new password is saved as soon as you click OK. You do not need to click the Save button. Passwords cannot be reused and must follow certain rules (see 7.1 “Main Features of the Tecan User Management System”, 7-2).

Click + in the top panel to create a new user. You will be prompted to specify the user name, the user’s full name and the user’s password:

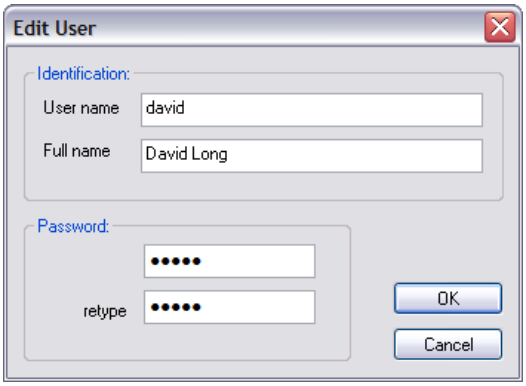


Fig. 8-8 *Edit User dialog box*

Password panel

The password which you assign to the new user is a temporary password. The user will be forced to enter a new password of his or her choice when logging in to the Tecan software for the first time. The temporary password is only valid for three days. You must assign a new temporary password if the user does not choose a new password within three days.

After creating a new user, you must log out from Freedom EVOware and log in again if you want to test the new user account (see 6.1.9 “Lock EVOware”, 6-7).

Click to delete the currently selected user. You cannot delete the user “Administrator”.

8.3.3.3 Groups Tab

The Group Name panel lists all of the user groups which are currently available. If you have installed more than one Tecan software component (e.g. Freedom EVOware and Magellan), the list will include default groups for all of the installed components. The default groups are created automatically when you install and configure the software components.

The panel to the right lists all available access rights for the currently installed Tecan software components and shows the access rights which are assigned to the currently selected user group. Users inherit the rights of the groups to which they belong.

When Freedom EVOware is first installed, the user group (user level) **Evoware_Application Specialist** is given the access rights “Application Specialist”. It is not recommended to change this setting since application specialists normally need all rights.

When Freedom EVOware is first installed, the user group (user level) **Evoware_Operator** is given the access rights “Operator”. For security reasons it is not recommended to change this setting and/or to assign additional rights.

When Freedom EVOware is first installed, the user group (user level) **Evoware_Power User** is given the access rights “Power User”. If necessary, you can give this user group additional rights for special applications. You can also create a new user group and give it a special set of rights to meet your needs.

The available rights are as follows:

Tab. 8-1 *Available rights which can be granted*

Rights	Explanation
Application Specialist	Application Specialist has all rights listed in this table.
Operator	Operator has rights to: • Run an existing pipetting script or process • Run maintenance scripts (see 6.4.2 “Run Maintenance”, 6-10) • View a pipetting script (but not change it) • Handle errors during pipetting
Power User	Same as Operator plus • Start running pipetting scripts at a specified line number • Run direct commands
Change Liquid Classes	Edit and create liquid classes
Edit Scripts	Edit and create pipetting scripts
Partial script running	Start running pipetting scripts at a specified line number
Bypass Timer	Skip pre-programmed timers during pipetting
Edit Carriers	Edit and create carriers
Edit Labware	Edit and create labware
Run direct commands	See 5.4.1.3 “Direct commands”, 5-10.
Configure System	Use the Freedom EVOware Configuration Tool

You do not need to (and cannot) assign users with **Administrator** rights to any groups since they automatically have all rights for the Tecan software.

See 7.2 “Freedom EVOware Access Rights (User Levels)”, 🗎 7-3 for more information on Freedom EVOware access rights and information on the rights of the System Administrator. Refer to the respective software manual for information on access rights for other Tecan software components (see 1.2 “Reference Documents”, 🗎 1-3).

Check or uncheck the *Select* checkboxes to change the access rights assignments as required.

To create a new group, click + and enter the name of the group in the new, blank line which appears.

To assign to a user to more than one Tecan software component (e.g. Freedom EVOware and Magellan), it is recommended to create a new, suitably named group instead of modifying the rights of an existing, group such as EVOware_Operator.

Click ✕ to delete the currently selected group. You cannot delete the default groups for the currently installed Tecan software components.

All changes relating to user management are recorded in the user management audit trail (see 7.1.1 “User Management Audit Trail”, 🗎 7-2).

8.4 Device Settings

Click the *Devices* tab to view or edit the device settings. This group of settings allows you to configure global settings for optional devices which can be attached to your pipetting instrument. It also allows you to configure the liquid handling arm and the instrument options.

Note: *Devices are invisible in the Freedom EVOware Control Bar and in the Configuration Tool if the respective device drivers are not installed.*

The global device settings apply to all process steps which use the device.

The usage of the dialog boxes is similar for all devices. Device-specific settings are described in the section on the respective device.

8.4.1 General Section

This section is used to configure general settings for the optional devices, the liquid handling arm and the instrument options. In addition, you can choose the colors which are used to display each of the devices in the Gantt chart of the runtime controller:

8.4.1.1 Device Information Tab

Select a device in the list to get general information on the device driver. The list only shows devices which have been installed. The following only describes the fields which are not self-explanatory:

Call name

The device name which used by Freedom EVOware internally.

File name, Version, Build

The file name, version and build version of the device driver.

Firmware

The device firmware version for which the driver was originally developed. Some devices do not have firmware. In many cases, the device driver will control the device correctly even if the stated firmware version and the actual firmware version of the device are not identical. However, this field may be useful to support engineers for the purpose of troubleshooting.

Start checkbox

Select a device in the list and check the *Start* checkbox if you want Freedom EVOware to load the device driver when it starts. The checkbox is shown in gray if the device does not have a loadable driver.

When you install Freedom EVOware, you normally only install the device drivers you want to use. If you later choose to disconnect a device from the pipetting instrument because it is no longer needed for your application or experiment, you can uncheck the *Start* checkbox to prevent the driver from being loaded and thus speed up the startup process.

Settings button

Select a device in the list and click *Settings* to make global configuration settings for the device (see 8.5 “Device Driver Configuration”, 8-39).

Unload drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see 5.1.2 “Driver pre-loading”, 5-2). Check this checkbox to disable driver pre-loading. In this case, Freedom EVOware will take somewhat longer to start in future.

8.4.1.2 Colors Tab

Select a device in the list, click in the Color column and click [...] to choose the required color for the device when it is displayed in the Gantt chart of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

8.4.2 Instrument Options Tab

This tab is used to configure settings for the liquid handling arm (LiHa), the PosID (movable barcode scanner), the MPO/LICOS system (Monitored Pump Option), system liquids (Chemical System) and the doorlocks. You can also configure settings for initializing the instrument arms.

8.4.2.1 LiHa (Liquid Handling Arm)

The LiHa (Liquid Handling Arm) is a robot arm on the pipetting instrument which is mounted on the X-slide and typically holds four or eight pipetting tips.

Initialization panel

Freedom EVOware detects automatically whether the instrument needs to be initialized, and carries out initialization if necessary. If your instrument is equipped with a LiHa, during initialization it is moved above the left-most waste and all dilutors are initialized. This can cause some liquid to drip from the tips.

Deep in Waste: If you check this checkbox, Freedom EVOware lowers the tips into the waste to minimize the risk of contamination due to stray drops of liquid during instrument initialization. See also 8.4.2.8 “Arm Initialization”, 8-31.

ATTENTION

Risk of the tips colliding with the waste and/or the washer.

- Please check the coordinates of the waste and/or the washer before activating these options. Otherwise the tips might collide with the labware.

DITI Handling panel

Optimize positions when fetching DITIs

If you check this checkbox, the following method is used to reduce the number of LiHa movements which are needed when getting DITIs (i.e. to speed up the Get DITI commands):

If you choose all of the tips in the Get DITI command, they are picked up starting at the beginning of the DITI rack (for the 8-tip LiHa: positions 1 to 8). The next eight tips are then picked up at positions 9 to 16.

If you do not choose all of the tips in the Get DITI command, they are picked up at the end of the DITI rack (starting at position 96).

This feature ensures that the beginning of the DITI rack always has full rows of fresh DITIs which can be picked up in a single movement.

This optimization feature is permanently activated for the Freedom EVO 75 pipetting instrument with the 2-tip LiHa or 8 PLus 1 Access option (see A.7 “Freedom EVO 75 Pipetting Instrument - LiHa Configuration”, A-30).

DITI fetch mode

Specify the required DITI fetch mode as follows:
Sequential: The DITIs are mounted one after the other sequentially..
Even/Odd: All of the even-numbered DITIs are mounted simultaneously (2, 4, 6, 8) followed by all of the odd-numbered DITIs simultaneously (1, 3, 5, 7). This option requires a reinforced DITI support bracket (hardware option).
All parallel: All of the DITIs are mounted simultaneously. This option is only allowed for mounting up to four DITIs (maximum). In addition, this option requires a reinforced DITI support bracket (hardware option).

The options Even/Odd and All Parallel reduce the time required to mount the DITIs (increased performance).

Speed up Movements panel

Use fast positioning in XZ

When the LiHa moves across a single labware item in the X direction, for example for reagent distribution, the tips are normally moved upwards (Z direction), then across to the next column of wells and then down again. Check this checkbox to enable smart moves. In this case, the X and Z movements take place simultaneously and the tips follow a curved or parabolic path instead of a rectangular path. This reduces the time required for the movement.

Optimize Z-travel

To avoid a collision, when the LiHa moves across different types of labware or across the entire worktable, the tips are normally moved upwards to the height you specify with the global parameter Travel Height (see below). The Optimize Z-Travel settings allows Freedom EVOware to make smart moves by analyzing the height of all obstacles along the path of travel and moving the tips up just enough to clear the highest obstacle. This reduces the time required for the movement.

No Z-travel optimization: Do not optimize the z movements. The tips will be raised to the specified global Travel Height when moving between different types of labware and across different carriers.

Optimize Z-travel within carriers: Raise the tips to clear all obstacles within the same carrier. The tips will be raised to the specified Travel Height when moving between different carriers or across the entire worktable.

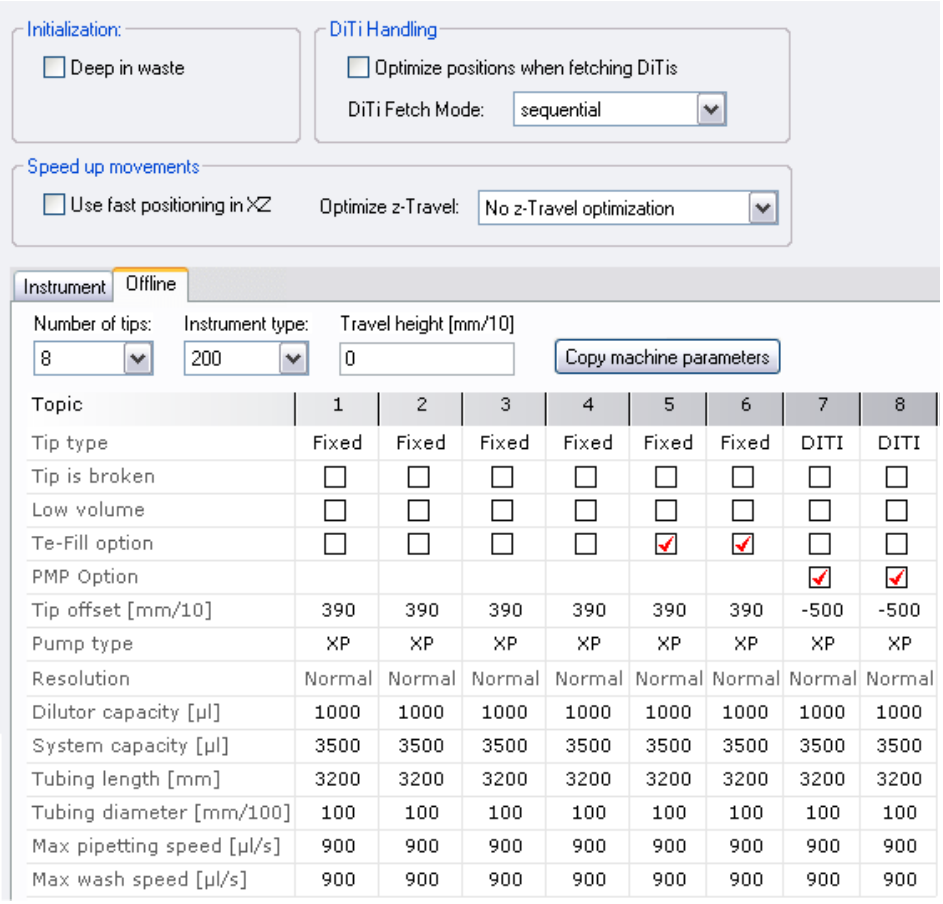
Optimize Z-travel for worktable: Raise the tips to clear all obstacles when moving across the entire worktable.

Instrument tab

If Freedom EVOware is running in normal mode and connected to a pipetting instrument, the liquid handling arm configuration (number of tips) and some of the other parameters are determined automatically by interrogating the instrument. Such parameters can only be configured manually on the Offline tab.

Note: *The settings on the Offline tab only apply to offline mode.*

Click the *Instrument* tab to see the current settings (you will only see four columns if you only have four tips):



Topic	1	2	3	4	5	6	7	8
Tip type	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	DITI	DITI
Tip is broken	☐	☐	☐	☐	☐	☐	☐	☐
Low volume	☐	☐	☐	☐	☐	☐	☐	☐
Te-Fill option	☐	☐	☐	☐	☑	☑	☐	☐
PMP Option							☑	☑
Tip offset [mm/10]	390	390	390	390	390	390	-500	-500
Pump type	XP	XP	XP	XP	XP	XP	XP	XP
Resolution	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal
Dilutor capacity [µl]	1000	1000	1000	1000	1000	1000	1000	1000
System capacity [µl]	3500	3500	3500	3500	3500	3500	3500	3500
Tubing length [mm]	3200	3200	3200	3200	3200	3200	3200	3200
Tubing diameter [mm/100]	100	100	100	100	100	100	100	100
Max pipetting speed [µl/s]	900	900	900	900	900	900	900	900
Max wash speed [µl/s]	900	900	900	900	900	900	900	900

Fig. 8-9 *Configuring the LiHa*

Number of tips

Specify the number of pipetting tips on the liquid handling arm.

Instrument type

Choose the width of the instrument's worktable (measured in grid positions).

Travel height

To avoid a collision, Freedom EVOware retracts the tips to a certain height when moving the LiHa across the worktable in the X and Y directions.

When the LiHa moves over a single labware item or between adjacent identical labware items, it retracts the tips to the Z-Travel value which is specified in the labware definition (see 9.4.3 "Labware Coordinates", 9-25). However, if consecutive commands cause it to move over different types of labware or across the entire worktable, the tips are retracted to the height you specify here. This is done to speed up and optimize LiHa movements (to avoid the need for repeated height changes during the movement). Travel Height (also called Global Z-Travel) is specified in instrument steps (0.1 mm). Choose the global parameter Travel Height to be higher than all obstacles on the woktable. See also Optimize z-travel, above.

A travel height of 0 is the highest position (tips fully retracted). Specify 200 in this field to lower the tips by 2 cm during global travel.

ATTENTION

Risk of the tips colliding with the PosID.

- Set Travel Height to the highest position (0) if your pipetting instrument is equipped with a PosID or PosID-3. Otherwise the tips may collide with the device.

The settings for the LiHa tips are as follows:

Tip Type

Choose the tip type (Fixed tips or DITIs, disposable tips). Freedom EVOware automatically sets the correct value for the tip offset. If you want to use a combination of fixed tips and DITIs, the fixed tips must have lower tip numbers (e.g. fixed tips at positions 1 to 4 and DITI tips at positions 5 to 8).

Tip is Broken

Check this checkbox to deactivate individual tips (including the corresponding dilutors and valves) if they are broken. Freedom EVOware will deactivate the affected tips/dilutors and check this checkbox automatically if it detects a tip or diluter problem. This is done to to prevent them being used for any further pipetting.

Note: *Freedom EVOware will output an error message if you use a broken tip in a pipetting script. Accordingly, it is also necessary to deselect broken tips in the pipetting commands.*

Low Volume

Check this checkbox if the tip position is equipped with the Low Volume option. If Freedom EVOware is running in normal mode and connected to a pipetting instrument, the Low Volume option is detected automatically. Accordingly, it can only be configured manually on the Offline tab.

Te-Fill Option

Check this checkbox if the tip position is equipped with the Te-Fill option. Te-Fill uses a bi-directional pump instead of the diluter to aspirate and dispense large volumes of liquid, for example buffer solutions.

PMP Option

Check this checkbox if the tip position is equipped with a special tip adapter for the PMP (Pressure Monitored Pipetting) option. PMP is only available for 200 µl and 1000 µl LiHa DITI tips. If Freedom EVOware is running in normal mode and connected to a pipetting instrument, the PMP option is detected automatically. Accordingly, the PMP option can only be activated manually on the Offline tab.

Tip Offset

Specify the length of the tip in instrument steps (0.1 mm). Freedom EVOware uses these values to calculate the correct Z-coordinates when using different tips in a pipetting run. The offsets are measured relative to the Reference Tip in increments of 0.1 mm. A positive value indicates that this tip type is longer than the Reference Tip. For example, 390 means that the tip is 3.9 cm longer than the Reference Tip. Tip offsets should be changed with great care and there is normally no need to modify them. Specify -270 for Te-PS tips.

Pump type

Specify which dilutor pump your pipetting instrument is fitted with (XP or XLP or XMP). The XP dilutor supports syringe sizes from 25 µl to 5 ml. The XLP dilutor supports syringe sizes from 50 µl to 50 ml. In addition it has a high resolution mode which allows more accurate pipetting. The XMP dilutor is used by the Freedom EVO 75 pipetting instrument.

Resolution

Specify the resolution of your dilutor pump (Normal or High). This parameter is only relevant for XLP dilutors.

Pipetting is more accurate in high resolution mode. However, the maximum pipetting speed is much less in this mode. This may be a disadvantage for viscous liquids and/or very low pipetted volumes, since droplets may remain attached to the tip due to surface tension.

Diluter Capacity

Choose the maximum volume in µl that the dilutor is able to dispense or aspirate with the current syringe size. The syringe size is on a label which is attached to the syringe.

System Capacity

Specify the system capacity in µl. For standard tips, this is the volume of the tubing from the tip to the dilutor valve (typically 3500 µl). If you are using the Low Volume option, this is the volume of the tubing from the tip to the pinch valve.

Freedom EVOware limits the maximum pipetting volume to the System Capacity or the Diluter Capacity, whichever is smaller.

Tubing Length

Specify the length of the tubing between the diluter and the liquid handling arm in mm. The PMP option (if fitted) uses this information to calculate the volume of the liquid system of the pipetting instrument. Specify 3200 mm if the pipetting instrument only has one LiHa; Specify 3900 mm if the pipetting instrument has two LiHas and the PMP option is fitted to the left LiHa.

Tubing Diameter

Specify the internal diameter of the tubing between the diluter and the liquid handling arm in 0.01 mm. The PMP option (if fitted) uses this information to calculate the volume of the liquid system of the pipetting instrument. The default value of 100 (= 1 mm) should not be changed. The PMP option does not currently support other tubing diameters.

Max. Pipetting Speed

Specify the maximum flow rate of liquid through the LiHa dilutor when pipetting. Freedom EVOware calculates an appropriate value automatically. You will get a validation error if the liquid class you are using in your pipetting script specifies a higher speed than this. You may need to reduce the max. pipetting speed for viscous liquids.

Max. Wash Speed

Specify the maximum flow rate of liquid through the LiHa dilutor when washing the tips. Freedom EVOware calculates an appropriate value automatically. You can reduce the max. wash speed for viscous liquids.

For standard tips or DITIs, the maximum dilutor speed (pipetting or washing) depends on the dilutor capacity (syringe size) as follows:

Tab. 8-2 Max. dilutor speeds for the LiHa (pipetting or washing)

Dilutor capacity	Max. dilutor speed	Max. breakoff speed
25 µl	21 µl/s	11 µl/s
50 µl	42 µl/s	23 µl/s
100 µl	83 µl/s	45 µl/s
250 µl	208 µl/s	113 µl/s
500 µl	417 µl/s	225 µl/s
1000 µl	833 µl/s	450 µl/s
2500 µl	2083 µl/s	1125 µl/s
5000 µl	4167 µl/s	2250 µl/s

The breakoff speed is the recommended final dilutor speed when dispensing. See 10.2.2 “LiHa Dispense Parameters (Fixed Tips and DiTis)”, 🗎 10-12.
If you are using the XLP dilutor pump in high resolution mode, the maximum dilutor speeds are 12.5% of the values given in the above table (Freedom EVOware calculates an appropriate value for the XLP dilutor pump automatically).

Offline tab

Click the *Offline* tab to specify the required configuration of the liquid handling arm and the tip parameters if Freedom EVOware is running in offline mode. See *Instrument* tab, above, for a description of the parameters.

Copy machine parameters

Click this button to copy the current parameters from the *Instrument* tab to the *Offline* tab. This allows you to create processes and scripts in offline mode without having to specify all of the liquid handling settings manually.

8.4.2.2 PosID (Moveable Barcode Scanner)

This tab is used to specify custom command strings for the PosID (Positive Identification System). The PosID is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. Note: The allowed barcode types are configured with the PosID command (see 15.63 “PosID Command”, 🗎 15-150). This tab is not shown if you have installed the driver for the PosID-3 barcode scanner, which supercedes the PosID barcode scanner.

Commands for Custom Labware panel

Specify the firmware commands which should be sent to the PosID before each pipetting script is started. This is normally only necessary for custom labware; standard Tecan labware is handled by the PosID automatically.

Click + to add a new entry to the list. Click to delete the currently selected entry. Click or to change the sort order of the entries.

The following example shows the three commands which are required to define a strip rack with carrier code 500, which is similar to a standard strip rack with code 016:

SPS1,16,3,0,200,188,7,1
SPC1,1,0,0,1
SPA500,1,1

See the manual “Command Set, PosID firmware (Doc ID 391141)” for a list of firmware commands. Firmware commands are nearly always written uppercase.

The above commands only define the custom labware for the PosID. You must also define it as labware in Freedom EVOware to allow it to be used in a script. Only use barcode numbers in the range 500 to 999 for custom labware.

The settings on this tab do not apply to the PosID-3.

8.4.2.3 MPO/SPO and LICOS

The MPO (Monitored Pump Option) consists of FWO (Fast Wash Option) and LICOS (Liquid Container Supervisor). The Fast Wash Option is used to pump a large amount of liquid at high speed through the system, normally to rinse the tips. The LICOS option is a device which monitors the liquid level in the waste and system liquid containers. The SPO supersedes the MPO and has improved liquid level sensors for the waste and system liquid containers.

This tab is used to set parameters for the MPO/SPO and for LICOS:

MPO flow rate

MPO is normally used for washing standard tips. This option allows you to reduce the default flow rate and thus the pressure in the tubing. This can be useful when special (smaller) tips are used. Do not use a flow rate in excess of 80% if you are using the Pressure Monitored Pipetting (PMP) hardware option. PMP is only available for DITI tips.

LICOS

Check this checkbox to activate the LICOS option. You can then specify the liquid levels at which an error message will be output and the system will be paused. This option is only relevant if your pipetting instrument is fitted with the LICOS option.

Freedom EVOware checks the liquid levels in the waste and system liquid containers each time the tips are washed. It also checks the liquid level in the system liquid container when the Aspirate script command is executed if you choose to aspirate the system liquid.

You must use the Tecan *Setup & Service* software to calibrate the LICOS. See 1.2 “Reference Documents”, 1-3 for information on this software.

SPO

Check the checkbox to activate the SPO liquid level sensors for the waste and system liquid containers. An error message will then be output and the system will be paused if the waste container is full or the system liquid container is empty. This option is only relevant if your pipetting instrument is fitted with the SPO option.

Freedom EVOware checks the liquid levels in the waste and system liquid containers each time the tips are washed. It also checks the liquid level in the system liquid container when the Aspirate script command is executed if you choose to aspirate the system liquid.

8.4.2.4 Te-Fill option

The Te-Fill option uses a bi-directional pump instead of the diluter to aspirate and dispense large volumes of liquid, for example buffer solutions. The Te-Fill option can be optionally provided with a 6-way valve, which allows you to switch between six different liquid containers.

The pipetting commands for the Te-Fill option cause the pipetting instrument to switch from using the diluter to using the bi-directional pump and to switch back again when the command is finished.

Te-Fill Pump

6-way valve connected

Check this checkbox if the Te-Fill option is fitted with a 6-way valve. If required, you can assign the names of the liquids you want to use to the channels of the 6-way valve (see 8.4.2.6 “6-way valve for Te-Fill”, 8-31).

8.4.2.5 System Liquids

The system liquids option allows you to use up to six different system liquids in the pipetting instrument. It uses a 6-way valve to choose the required liquid.

The system liquids option is not currently available for the Freedom EVO series of pipetting instruments.

System Liquids panel

Specify the names of the system liquids you want to use in the System Liquids panel. Click + to add a new entry to the list. Click to delete the currently selected entry. Click or to change the sort order of the entries.

The available system liquids are then shown as green bars in the System icon at the bottom right of the Worktable Editor, one bar for each liquid. See Fig. 11-8 “Example worktable showing carriers, labware and labware labels”, 11-20 for an example of the System icon. In the example, only one green bar is shown (only one system liquid is available).

When you specify an Aspirate script command and want to aspirate the system liquid, click directly on the green bar in the System icon at the bottom right of the Worktable Editor. If you need to aspirate large volumes of the system liquid, this avoids having to place a trough on the worktable.

After clicking on the green bar, the gray (protected) field in the dialog box of the pipetting command then shows the reserved labware label *Systemliquid*.

At present, the Freedom EVO series of pipetting instruments only allows you to use one system liquid.

8.4.2.6 6-way valve for Te-Fill

The Te-Fill option uses a bi-directional pump instead of the diluter to aspirate and dispense large volumes of liquid, for example buffer solutions. The Te-Fill option can be optionally provided with a 6-way valve, which allows you to switch between six different liquid containers.

Specify the names of the liquids you want to use to the channels of the 6-way valve. Click + to add a new entry to the list. Click to delete the currently selected entry. Click or to change the sort order of the entries.

The assigned names will then be shown in the Te-Fill pipetting commands in the *Channel / Liquid* pull-down list.

See also see 8.4.2.4 “Te-Fill option”, 8-30.

8.4.2.7 Doorlocks

Freedom EVOware supports up to four electrically-operated doorlocks which are fitted to the pipetting instrument and the doorlocks are arranged in groups. This function is used to assigned each of the doorlocks to one of the four available groups.

The doorlocks of all groups are locked automatically when starting or continuing a script. The doorlocks of all groups are unlocked automatically when finishing, pausing or aborting a script. See 2.6 “Safety Features of the Pipetting Instrument”, 2-4.

Doorlock panel

The Freedom EVO pipetting instrument is always fitted with two doorlocks (Doorlock 1 and Doorlock 2) and they are permanently assigned to Doorlock Group 1 (their assignment cannot be changed). A mechanical interlock ensures that scripts and processes cannot be started unless the safety hoods are closed and locked. Two additional doorlocks can be fitted to the pipetting instrument to support special hardware arrangements.

Specify the required doorlock group assignment for doorlocks 3 and 4 by choosing the required group from the list. Choose *none* if the additional doorlocks are not fitted to your instrument.

8.4.2.8 Arm Initialization

Each time Freedom EVOware or an Freedom EVOware script or process is started, the status of the instrument arms (LiHa, RoMa and PnP) and optional devices (e.g. Te-MO and Te-VacS) is checked and they are initialized if necessary. In addition, a full initialization sequence is carried out when Freedom EVOware is started for the first time after powering up the instrument.

When the instrument arms are initialized, a sequence of movements is carried out to determine the reference (zero) positions along the X, Y and Z axes. During the full initialization sequence, the arms need to move fully to the rear of the instrument to determine the zero position in the Y direction.

You can also initialize the instrument manually by clicking the Initialize button in the toolbar (see 6.7 “Freedom EVOware Toolbar”, 6-18).

A progress bar shows the progress of the initialization:

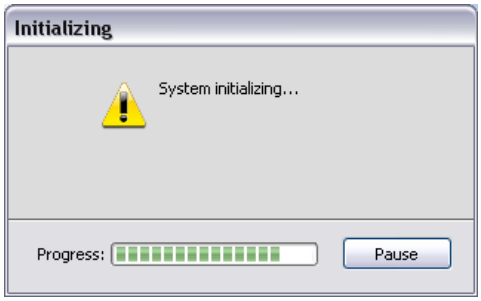


Fig. 8-10 *Initializing the pipetting instrument*

Click *Pause* if you want to pause the initialization procedure. This unlocks the doorlocks and switches off the electrical power to the motors which move the instrument arms (LiHa, RoMa, PnP). The arms can then be moved along the slides manually. To speed up initialization If the arms are far away from their home (parking) positions, click Pause, move them closer to their home positions and then click Resume. The doorlocks will lock again and initialization will continue.

If initialization fails, for example because Freedom EVOware is unable to communicate with one of the devices, a dialog box is shown with information on the error(s). If one of the error messages is shown truncated because it is too long, lengthen the field in the dialog box and activate the horizontal scroll bar by double-clicking on the divider (short vertical line in the header) at the end of the field.

The configuration options for the initialization procedure are as follows:

Initialization mode: Standard

With the Freedom EVO series of pipetting instruments, during initialization all arms move from their current position to the rear of the worktable to initialize all of the axes. After reaching the rear of the instrument, they then move to the rear left.

The arms then move to their home (i.e. safe or parking) positions if they have been defined (see 9.6.4 “Defining the Home Position for a RoMa”, 🗎 9-62 and 9.7.4 “Defining the Home Position for a PnP”, 🗎 9-69).

Initialization mode: To the front

If the rear of the worktable is occupied by large (i.e. high) objects such as the Te-MO, choose *To the front* to avoid a collision during full initialization. You must then specify a grid position range in the *From grid* and *To grid* fields.

Empty space on worktable for Y initialization

Specify a grid position range in the *From grid* and *To grid* fields to indicate where it is safe to move the arms to the rear of the instrument (i.e. where there are no other objects which could obstruct the arm movements). Since, with this option, the arms move one at a time to the rear, the grid position range only needs to be wide enough to accommodate one arm.

8.4.2.9 Te-MO

The Te-MO is a robot pipetting device which can be attached to the worktable of the pipetting instrument. It is equipped with a specially designed multi-pipetting head which can pipette to up to 384 wells simultaneously, resulting in an extremely high throughput and efficiency.

Settings panel

The following parameters can be configured for the Te-MO.

Number of tips

Specify the number of pipetting head tips you want to use if you are running Freedom EVOware in offline mode (96 or 384). If Freedom EVOware is running in normal mode and connected to a pipetting instrument which is fitted with a Te-MO, the number of tips is determined automatically by interrogating the Te-MO.

Global Z-Travel

To avoid a collision, Freedom EVOware retracts the Te-MO pipetting head to a certain height when moving it across the Te-MO deck in the X and Y directions (see 9.4.3 “Labware Coordinates”, 9-25).

When the Te-MO moves over a single labware item or between adjacent identical labware items, it retracts the pipetting head to the Z-Travel value which is specified in the labware definition. However, if two consecutive commands cause it to move over different pieces of labware, the pipetting head is retracted to the height you specify here. This is done to speed up and optimize Te-MO movements (to avoid the need for repeated height changes during the movement).

Global Z-Travel is specified in instrument steps (0.1 mm). A travel height of 0 is the highest position (pipetting head fully retracted). Specify 200 in this field to lower the pipetting head by 2 cm during global travel (range: 0 to 200).

Turn PWM checking off

The servo motors of the Te-MO monitor the downwards force which is applied when mounting DITIs. Check this checkbox to disable force feedback. This is only necessary for special applications. This setting is only intended for specialists such as Tecan Field Service Engineers.

8.4.2.10 MCA96

The Multi Channel Arm (MCA) is a special liquid handling arm which is fitted with a 96-tip pipetting head. The pipetting head can be fitted with a tipblock (a replaceable block with 96 tips) or with DITIs. The spacing between the tips is fixed (9 mm).

Initialization panel

Park over washer: Check this checkbox if you want the MCA96 to move above the MCA96 Wash & Refill Center (WRC) and wait there after the pipetting script or process has finished.

Instrument tab

Travel height

To avoid a collision, Freedom EVOware retracts the tips to a certain height when moving the MCA96 across the worktable in the X and Y directions (see 9.4.3 “Labware Coordinates”, 9-25).

When the MCA96 moves over a single labware item or between adjacent identical labware items, it retracts the tips to the Z-Travel value which is specified in the labware definition. However, if two consecutive commands cause it to move over different pieces of labware, the tips are retracted to the height you specify here. This is done to speed up and optimize MCA96

movements (to avoid the need for repeated height changes during the movement). Travel Height (also called Global Z-Travel) is specified in instrument steps (0.1 mm). Choose Travel Height to be higher than all obstacles on the worktable.

A travel height of 0 is the highest position (tips fully retracted). Specify 200 in this field to lower the tips by 2 cm during global travel.

ATTENTION

Risk of the tips colliding with the PosID.

- Set Travel Height to the highest position (0) if your pipetting instrument is equipped with a PosID or PosID-3. Otherwise the tips may collide with the device.

Max. Pipetting Speed

Specify the maximum flow rate of liquid through the dilutor when pipetting. Freedom EVOware calculates an appropriate value automatically. You can reduce the max. pipetting speed for viscous liquids. If you specify higher speeds in your pipetting script, Freedom EVOware will limit them to this value.

Washer address

Specify the hardware address of the MCA96 Wash & Refill Center (WRC). Specify the address as “address on the switch plus 1” (default: O7). Each physical device (regardless of device type) must have a unique hardware address.

The MCA96 allows you to use two WRCs. To do this, specify both hardware addresses separated by a semicolon, e.g. O7;O8. Freedom EVOware will then search the worktable for MCA96 WRCs and assign the address O7 to the first one on the worktable and O8 to the second one. The search order on the worktable is from rear to front and then from left to right.

Gripper type

Choose the gripper type which is fitted to the MCA96 from the pull-down list.

Offline tab

Click the *Offline* tab to specify the required configuration of the MCA96 if Freedom EVOware is running in offline mode. See above, for a description of the parameters.

Copy machine parameters

Click this button to copy the current parameters from the *Instrument* tab to the *Offline* tab. This allows you to create processes and scripts in offline mode without having to specify all of the settings manually.

Has gripper

Check this checkbox if you want to simulate an MCA96 with the gripper hardware option.

Gripper type

Choose the MCA96 gripper type which you want to use for offline mode.

8.4.2.11 MCA384

The MCA384 (Multi Channel Arm 384) is a special liquid handling arm which can be fitted with 96 or 384 fixed tips or with 96 or 384 disposable tips (DITIs). The

spacing between the tips is fixed (9 mm and/or 4.5 mm). So-called head adapters are used to adapt the pipetting head to the different tip types.

Settings panel

Washer address

Specify the hardware address of the MCA384 Wash & Refill Center (WRC). Specify the address as “address on the switch plus 1” (default: O7). Each physical device (regardless of device type) must have a unique hardware address.

The MCA384 allows you to use two WRCs. To do this, specify both hardware addresses separated by a semicolon, e.g. O7;O8. Freedom EVOware will then search the worktable for MCA384 WRCs and assign the address O7 to the first one on the worktable and O8 to the second one. The search order on the worktable is from rear to front and then from left to right.

Advanced Z-Travel

Check this checkbox if you want the MCA384 to make smart moves by analyzing the height of all obstacles along the path of travel across the entire worktable and moving the tips up just enough to clear the highest obstacle. This reduces the time required for the movement. See also 9.5.5.1 “Labware Carrier Attributes”, 9-49, ZTravel parameter.

8.4.2.12 RoMa

The RoMa is a robot arm equipped with special grippers that can pick up, transport and place objects within the working area of the pipetting instrument.

Optimize vectors

Depending on how the RoMa vectors have been have created, Freedom EVOware may send consecutive movement commands to the pipetting instrument which command the RoMa to move to identical position coordinates. This can occur e.g. if the waypoints in the RoMa vector uses a mixture of absolute and relative positions to move to different sites in a hotel. Check this checkbox to suppress the additional (and unnecessary since identical) movement commands. This reduces the time required by the RoMa vector by reducing the number of firmware commands which are sent.

Enable round moves

When carrying out a RoMa vector, the RoMa normally moves to each waypoint which is specified in the vector before starting to move to the following waypoint. If you check this checkbox, the RoMa will start to move to the following waypoint before it has fully reached the current waypoint. Depending on the RoMa vector, the RoMa can be seen to cut corners (round off the corners) as it moves, instead of moving in a straight line. This reduces the time required by the RoMa vector. Note: The collision avoidance algorithms have a higher priority and will ensure that no collisions will occur, even when cutting corners.

8.4.3 Communication Section

This section is used to configure the data communication between Freedom EVOware, the pipetting instrument and the optional devices.

8.4.3.1 I/O State Tab

Select a device in the list and check or uncheck the *Active* checkbox to enable or disable data communication with the device.

Set the I/O State to ON for all devices which are installed and physically connected to the PC.

For devices with an RS232 interface, if you set the I/O state to ON you must also choose a unique COM port address with the COM Ports tab. This is also necessary if you are running Freedom EVOware in offline mode.

Note: *After installing Freedom EVOware, data communication is initially set to OFF for all devices with a COM interface. The PC cannot communicate with the device if the I/O status is OFF.*

Note: *Freedom EVOware automatically disables data communication with the LiHa and the RoMa if it cannot detect a hardlock (dongle) when it starts. Pipetting is not possible in this case.*

8.4.3.2 Logging Option

Select a device in the list and check the checkbox if you want to log the exchange of firmware commands between the device driver and the device, including commands which are exchanged through an RS232 connection to the device. This can be useful for testing purposes. The information which is logged can be viewed in Tecan/Drivers/<call_name> channel of the LogViewer tool, where <call_name> is the device call name in Freedom EVOware (see A.10 “LogViewer Tool”, A-72).

For devices which are connected to the CAN bus of the pipetting instrument, you can also log the exchange of firmware commands by checking *Log serial data* in the Protocol files tab (Instrument settings, General section). See 8.3.1.4 “Protocol Options Tab”, 8-8.

To avoid logging an excessive amount of data, this logging feature should be disabled when it is not needed.

8.4.3.3 Com Ports Tab

This tab is used to choose the COM port that you want to use for devices which are connected to the PC via a dedicated RS 232 interface (serial interface). You can also choose the COM port for the pipetting instrument.

Note: *Some of the devices such as the RoMa, the LiHa and the incubators are connected to the data bus (CAN bus) of the pipetting instrument. You cannot (and do not need to) make COM port settings for such devices.*

Select a device in the list, click in the Port column and choose the COM port which you want to use for data communication from the pull-down list. The pull-down list shows all of the COM ports which are currently installed in the PC.

The *Port information* panel shows the currently configured interface settings:

Baud rate, Data bits, Stop bits, Parity

This shows the speed of data transmission, the number of data bits, the number of stop bits and the parity for the data transfer.

Receive Retries, Transmit Timeout

This shows the number of retries and the transmit timeout for the data connection.

Flow Control

This shows the flow control method which is used for the data connection ('none', 'X-On/X-Off' 'Hardware' or 'undefined').

With the exception of the COM port, Freedom EVOware automatically sets the parameters to the appropriate values for each of the devices. If the data communication settings of the device's serial interface are configurable, make sure that you set them to the values shown in the *Port information* panel. See the hardware manual for the device for further information (see 1.2 "Reference Documents", 1-3).

If Freedom EVOware is not able to communicate successfully with the device, make sure that the device's serial interface has been configured correctly. Also make sure that you are using the correct serial interface cable. Some devices have firmware commands (such as Get_Version) which can be used as a simple test of the data communications (see 8.4.3.4 "Test Tab", 8-37).

For some devices, you must first switch the device to Remote or Slave mode to allow Freedom EVOware to control it remotely through its data interface. Typically, this is done using the buttons on the front panel of the device. See the hardware manual for the device for further information (see 1.2 "Reference Documents", 1-3).

Note: *The PC cannot communicate with the device if the I/O Status is OFF (see 8.4.3.1 "I/O State Tab", 8-36).*

8.4.3.4 Test Tab

The Test tab allows you to send firmware commands (command strings) to the selected device and is only intended for specialists. It can be used e.g. to initialize the device, test communications with the device and to move the arms etc. to a specified position.

In many cases, the Command name panel is pre-configured with useful command strings (but some of the devices have no command strings). Select the device, select one of the pre-configured strings and click *Send*. The response string from the device will be displayed in the Response panel.

To send a custom command string, click +, specify the command in the Command column and click *Send*. You do not need to specify a command name. Custom command strings cannot be saved permanently. See the hardware manual for the device for a full list of command strings (see 1.2 "Reference Documents", 1-3). Alphabetic characters in command strings are nearly always written uppercase.

For descriptions of the pre-configured command strings which are available for each device, see the section "Firmware commands" for the device (see 8.5 "Device Driver Configuration", 8-39). The section "Firmware commands" is only available if the device has pre-configured command strings.

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.4.4 Scheduling Section

The Scheduling section lets you specify how the driver will react if errors occur during execution of one of its commands. You can also set general scheduling options for the driver.

8.4.4.1 Resource Locking Tab

Check the *Lock* checkbox if you want the device to be unavailable for other actions during execution of its pre-actions and post-actions. You can uncheck this checkbox to improve scheduling efficiency if you are using standard Tecan RoMa's which support automatic collision avoidance. In the case of the LiHa, this allows the RoMa to fetch new labware while the LiHa is still busy.

The Te-MO is normally treated as two separate resources (the two outer slides are controlled independently). For example, the RoMa can exchange the microplates on one of the slides while the other slide is being used for pipetting. Check the *Lock* checkbox if you want to treat the Te-MO as one resource, for example if you only want to use one of the slides.

Do not uncheck this option if you are using third party robots which do not support automatic collision avoidance.

8.4.4.2 Error Reaction Tab

Check the *Pre-action* and/or *Post action* checkboxes if you want a "Loss of peripheral" error to be triggered for the selected device if an error occurs during execution of its pre-actions and/or post-actions.

If for example the RoMa_MoveObject command fails when transporting labware to a device, preventing further access to the device, the "Loss of peripheral error" stops Freedom EVOware from trying to use the device in future. For example, if a labware item is physically obstructing the entrance to an incubator, to prevent further errors the incubator will no longer be used, even if the incubator is still fully functional.

8.4.4.3 Pause On Error Tab

The *Pause on error* panel specifies which kinds of device errors will result in a system pause. Check the corresponding boxes if you want the system to halt on all errors, on loss of peripheral errors, on pre-action errors and/or on post-action errors.

The *Pause on error* settings can also be made individually for each process step (see 9.10.2.2 "Pause On Error Tab", 🗎 9-72). Check *Enforce these settings* if you want the settings in this tab to override the settings for the process steps.

8.4.4.4 Pre-emptive Tool tab

Freedom EVOware can be instructed to check the process for device commands which are soon due for execution (look ahead). Depending on the device type and the command, this allows Freedom EVOware to send preparatory instructions to the device to speed up the execution of the command.

To activate this feature, you must check the Enable pre-emptive tool operations checkbox on the Scheduler tab (see 8.3.1.3 "Scheduler Tab", 🗎 8-5, Tool Optimization panel).

For example, the carousel can be instructed to bring the next labware item to be processed from the carousel tower to the transfer position, where it can wait for a subsequent fetch command (RoMa movement). The RoMa then does not have to

wait for the labware to be brought from the tower. This optimizes the movement times for the carousel.

Pre-emptive tool operations are only available for the carousel and some third-party incubators.

The parameters in this panel are as follows:

Device

Name of the device which can be optimized by pre-emptive instructions.

Macro name

Choose the internal command (macro) to use for the preparatory instructions. The pull-down list shows all of the commands which are available for the selected device. For the carousel and the carousel NT, you should normally choose the internal command PrePresentPlate (see 16.3.11 “Carousel - PrePresentPlate Command”, 16-7 and 16.4.14 “Carousel NT - PrePresentPlate Command”, 16-15).

Time frame

Specify in seconds how far ahead the scheduler should check the process for the specified internal command (look ahead time). The time you specify should be about the same time which is required for the preparatory instructions (e.g. about the same time which is required to bring the labware from the carousel tower to the transfer position).

Very long times can increase the risk of unnecessary unloading of labware from the carousel due to changes in the schedule. This will result in time wastage since the unloaded labware has to be put back in the carousel tower before another labware item can be brought.

If the location is an incubator, keep in mind that pre-emptive tool operations can affect the incubation time specified in the process if the look ahead time is longer than necessary, since the labware could be removed from the controlled environment earlier than necessary.

8.5 Device Driver Configuration

The optional devices which connected to your pipetting instrument each have individual settings that can be adjusted to your needs. To access these settings, start the Configuration Tool, click the *Devices tab*, click *Device Information*, select the required device in the **Devices** panel, click the *Settings* button and click the *Settings* tab of the Configure Device Driver Properties dialog box.

The **Information** panel shows general information on the device and the device driver (see 8.4.1.1 “Device Information Tab”, 8-21).

The usage of the *Driver* tab is the same for all devices and is described in 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

The usage of the *Conversion* tab is the same for all microplate readers and is described in 8.5.34.3 “Microplate Reader Configuration - Conversion Tab”, 8-115. The *Settings* tab for microplate readers is described in 8.5.34.2 “Microplate Reader Configuration - Settings Tab”, 8-114.

8.5.1 Settings for the Barcode Scanner

This is used to configure settings for the Symbol LS-1220 barcode scanner. For general information on this device, see 16.2 “Commands for the Symbol LS-1220 Barcode Scanner”, 16-1.

8.5.1.1 Barcode Scanner Configuration - Settings Tab

The Settings tab is used to make general settings for the Barcode Scanner.

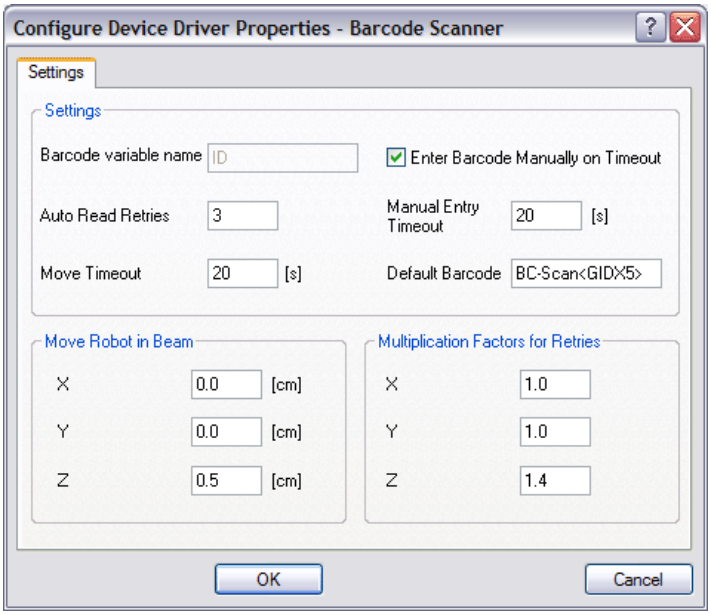


Fig. 8-11 *Settings tab of the Barcode Scanner driver*

Settings panel

Barcode variable name

Specify the name of an internal variable which should be used to store the barcode which is scanned. The default variable name for barcodes is “ID”.

Enter Barcode Manually on Timeout, Manual Entry Timeout

If you check *Enter Barcode Manually on Timeout*, the operator will be prompted to enter the barcode manually during process runtime if the scanner was unable to read it, despite retries. A default barcode will be used if the operator does not enter the barcode within the specified time (*Manual Entry Timeout* field).

If you do not check *Enter Barcode Manually on Timeout*, a default barcode will always be used if the scanner was unable to read it.

Default Barcode

The following placeholders can be used in the *Default Barcode* field:

Tab. 8-3 *Placeholders for use in default barcodes*

Placeholder	Example	Description
<IDX> or <GIDX>	123	Counter
<IDX***n***> or <GIDX***n***>	004	Counter which is adjusted to a length of n digits using leading zeros

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text.

Example: Use the following string to generate default barcodes containing the string “Generated” and a 4-digit counter:

Generated<IDX4>

(e.g. Generated0003).

Example: Use the following string to generate default barcodes containing the string “Unreadable” and a counter:

Unreadable<IDX>

(e.g. Unreadable2)

Auto Read Retries

Specify how many times the device should try to read the barcode before considering it unreadable.

Move Timeout

Specify the timeout for the robot move which is associated with the ReadBarcode command. An error message will be output if the robot takes longer than this to move.

Move Robot in Beam

Specify the distances in the x, y and z directions that the robot should move the labware in the scanner beam when scanning.

Multiplication Factors for Retries

Specify multiplication factors for the distances in the *Move Robot in beam* field.

If the labware cannot be scanned on the first try, the distances in Move Robot in Beam are multiplied by the specified multiplication factors for each successive attempt, resulting in larger distances each time. This allows Freedom EVOware to search for the barcode label with the help of the robot in case it is not accurately positioned on the labware.

The barcode scanner can be configured to only accept the barcode types which are expected on your barcode labels. This makes it easier for the scanner to identify incorrect barcodes. This can be done by the Tecan Field Service Engineer using special configuration barcodes. The valid barcode types list is stored in the barcode scanner firmware.

8.5.1.2 Barcode Scanner Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Barcode Scanner in the Test tab of the Configuration Tool:

Read Barcode <STIE>

Performs a single read operation of the barcode scanner.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.2 Settings for the Carousel

This is used to configure settings for the Carousel. For general information on this device, see 16.3 “Commands for the Carousel”, 16-2.

8.5.2.1 Carousel Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.2.2 Carousel Configuration - Scanner Settings Tab

This tab is used to make settings for the optional barcode scanner of the carousel.

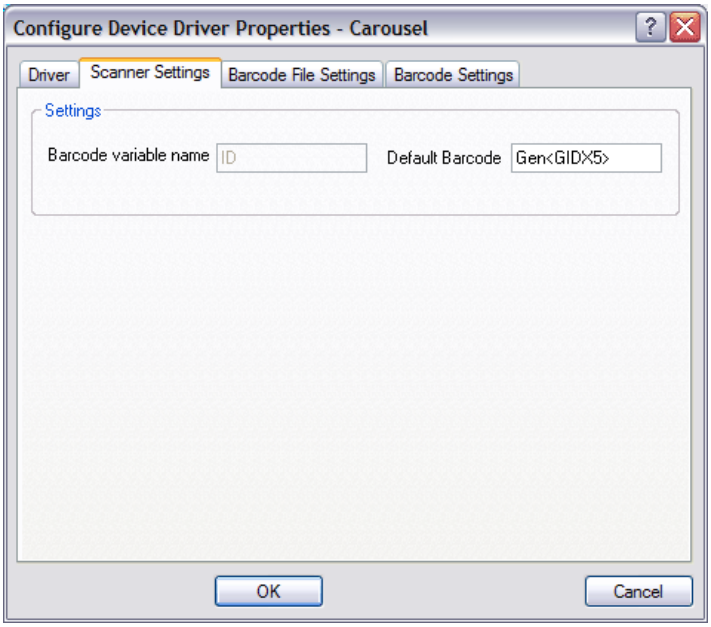


Fig. 8-12 *Scanner Settings tab of the Carousel driver*

Settings panel

Barcode variable name

Specify the name of an internal variable which should be used to store the barcode which is scanned. The default variable name for barcodes is “ID”.

Default Barcode

A default barcode will be used if the carousel barcode scanner was unable to read the barcode. The following placeholders can be used in the *Default Barcode* field:

Tab. 8-4 *Placeholders for use in default barcodes*

Placeholder	Example	Description
<IDX> or <GIDX>	123	Counter
<IDX***n***> or <GIDX***n***>	004	Counter which is adjusted to a length of n digits using leading zeros

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text.

Example: Use the following string to generate default barcodes containing the string “Generated” and a 4-digit counter:

Generated<IDX4>

(e.g. Generated0003).

Example: Use the following string to generate default barcodes containing the string “Unreadable” and a counter:

Unreadable<IDX>

(e.g. Unreadable2)

8.5.2.3 Carousel Configuration - Barcode File Settings Tab

The Carousel commands ReadAllBarcodes and ReadPlatesInCartridge read the barcodes of the labware in the carousel and create a barcode list in a text file. This tab is used to specify the filename and path of the barcode file.

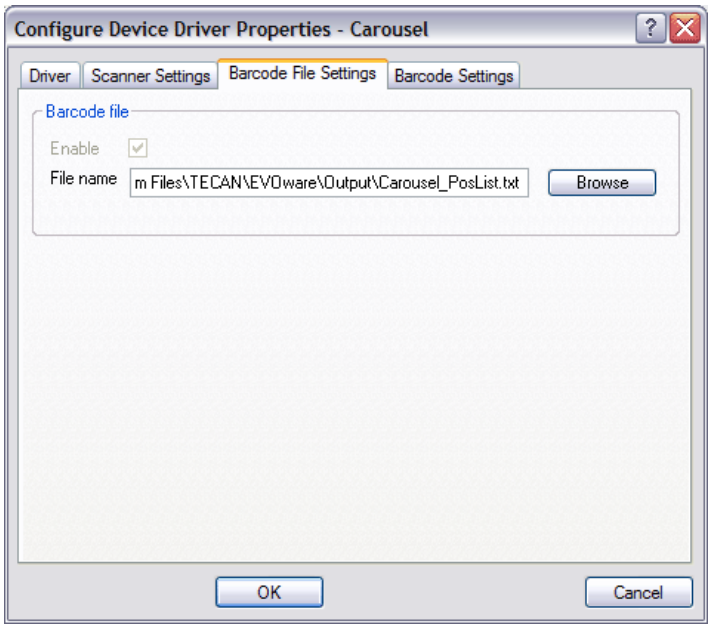


Fig. 8-13 *Barcode File Settings tab of the Carousel driver*

Barcode File panel

File name

Specify the filename and path of the barcode file. Specify the filename and path directly or click *Browse* and choose an existing file. See A.2.1 “Barcode files written by the Carousel commands”, A-11 for information on the barcode file which will be created.

Note: *When the barcodes are scanned, the barcode file will be overwritten if it already exists.*

8.5.2.4 Carousel Configuration - Barcode Settings Tab

The Barcode Settings tab is used to configure the barcode types which the carousel barcode scanner option will accept:

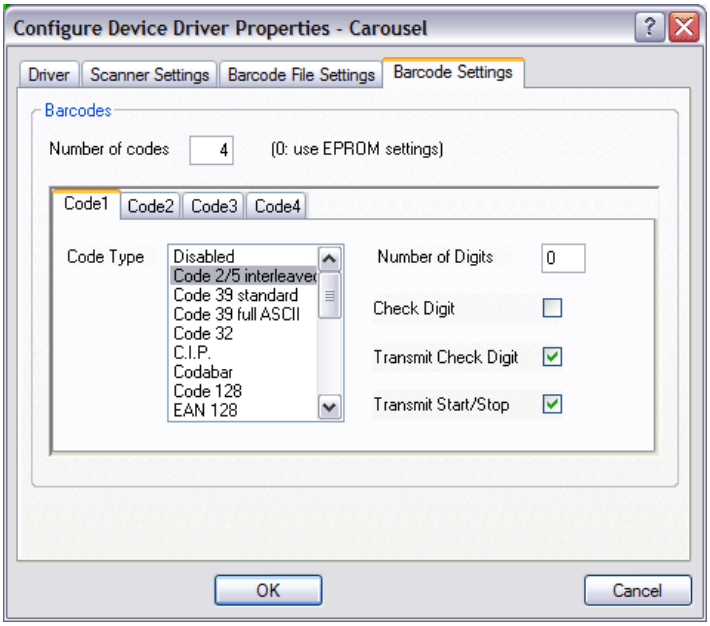


Fig. 8-14 *Barcode Settings tab of the Carousel driver*

Barcodes panel

Number of codes

Specify how many different barcode types you want to read (maximum 6). Depending on your setting, additional tabs will appear (Code1, Code2, etc.) where you can configure each of the barcode types you expect. You should only configure the barcode types which are expected on your barcode labels. This makes it easier for the scanner to identify incorrect barcodes.

If you set this field to 0, Freedom EVOware will use the settings stored in the barcode scanner firmware and you do not have to enter any further settings.

The following parameters must be set for each barcode type you want to read:

CodeX

Code Type

Select the barcode type from the list. The supported types are:

Disabled, Code 2/5 interleaved, Code 39 standard, Code 39 full ASCII, Code 32. C.I.P., Codabar, Code 128, EAN 128, Code 93 standard, Code 93 full ASCII, EAN 13, EAN 8, UPCA, UPCE, EAN 13 add on 2, EAN 8 add on 2, UPCA add on 2, UPCE add on 2, EAN 13 add on 5, EAN 8 add on 5, UPCA add on 5 and UPCE add on 5.

Number of Digits

Specify the length of the barcode.

Check Digit

Check this checkbox if the barcode includes a check digit.

Transmit Check Digit

Check this checkbox if you want to transmit the check digit to Freedom EVOware as part of the barcode.

Transmit Start/Stop

Check this checkbox if you want to transmit a start/stop code to Freedom EVOware as part of the barcode.

8.5.3 Settings for the Carousel NT

This is used to configure settings for the Carousel NT. For general information on this device, see 16.4 “Commands for the Carousel NT”, 16-8.

8.5.3.1 Carousel NT Configuration - Monitoring Tab

This tab is used to make settings for temperature and moisture monitoring of the carousel.

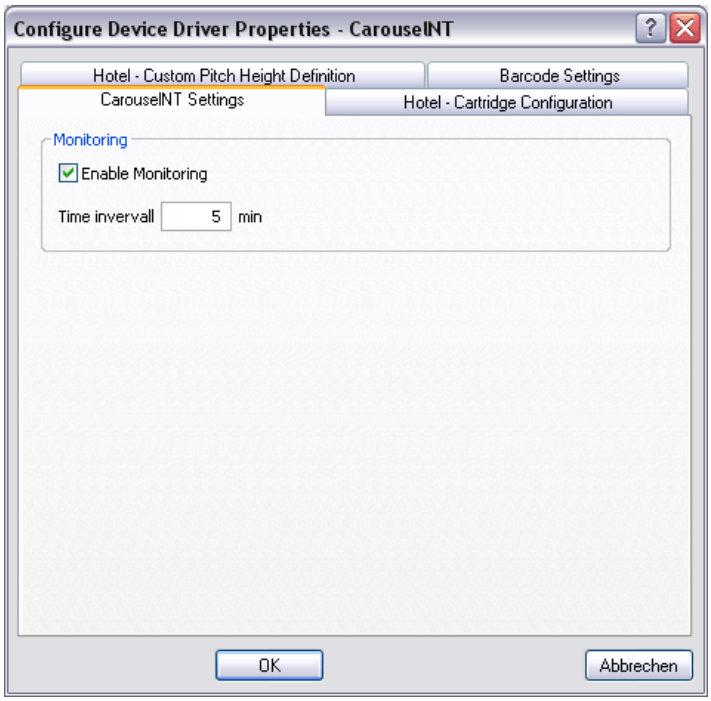


Fig. 8-15 *StoreX tab of the Carousel NT driver*

Monitoring panel

Enable monitoring

The Carousel NT is fitted with sensors which monitor the temperature and moisture level inside the carousel. Check this checkbox if you want the carousel to transfer this information to Freedom EVOware. The measured values are logged to the driver report file. See 8.4.3.2 “Logging Option”, 8-36 for information on how to activate the driver report file for the carousel.

In Freedom EVOware Plus, you can view the measured values by clicking on *Carousel NT* in the Devices panel of the runtime controller (extended view) after you have run the process (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14). The measured values will be shown in the Event Log panel. The values shown are not refreshed automatically. Click *Carousel NT* again to show the new values.

Time interval

Specify the frequency with which the carousel should report the the temperature and moisture level to Freedom EVOware.

8.5.3.2 Carousel NT Configuration - Hotel - Cartridge Configuration Tab

This tab is used to specify the labware type which can be stored in each of the carousel cartridges (towers). You must also specify the number of slots in the cartridge. The configuration of the exchangeable cartridges in the carousel depends on the requirements of your application, and the settings in this dialog box may need to be changed if you want to run another script or process.

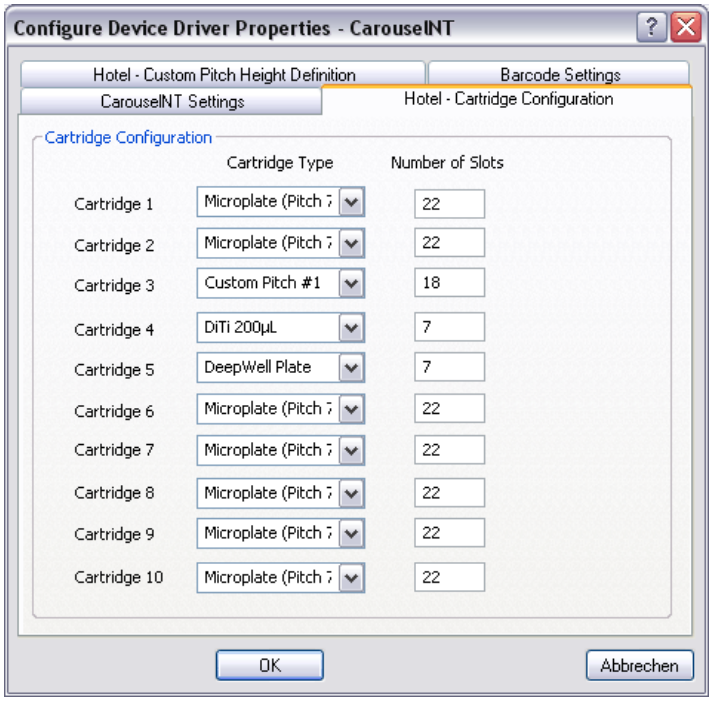


Fig. 8-16 *Hotel - Cartridge Configuration tab of the Carousel NT driver*

Cartridge Configuration panel

Cartridge type

Choose the labware type which can be stored in the selected cartridge (tower). The carousel uses this information to calculate the slot pitch height (the vertical distance in device steps between the bottoms of adjacent labware items). This information is required by the carousel feeder mechanism.

Use Custom pitch #1 to #10 heights for labware with non-standard pitch height (see 8.5.3.3 “Carousel NT Configuration - Hotel - Custom Pitch Height tab”, 8-46).

Number of slots

Specify the number of slots in the cartridge (the maximum number of labware items of this type which the selected cartridge can store).

The standard cartridge for microplates has a pitch height of 788 device steps per slot and has 22 slots. The special microplate cartridge with a pitch height of 719 device steps per slot has 24 slots.

8.5.3.3 Carousel NT Configuration - Hotel - Custom Pitch Height tab

This tab is used to specify the carousel slot pitch height for labware with non-standard pitch height. For standard labware types, the carousel has an internal table of slot pitch heights.

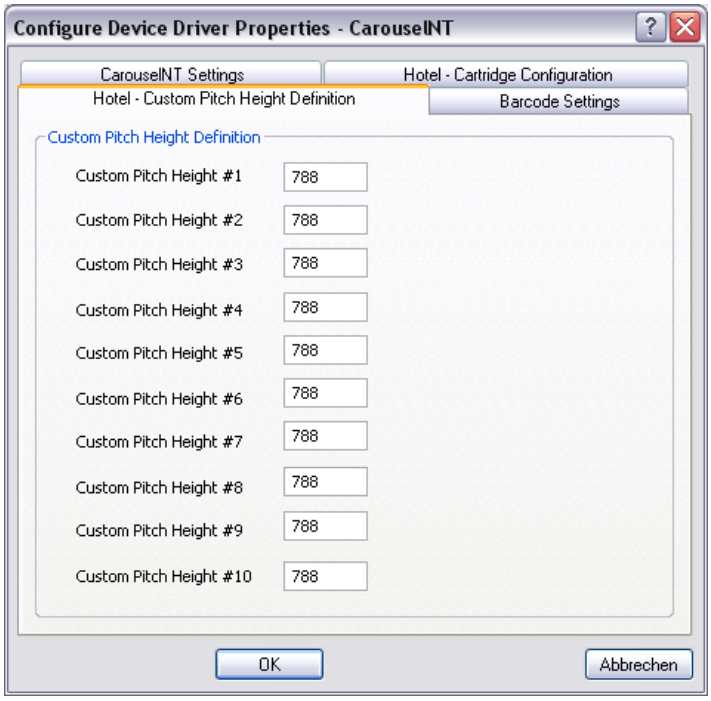


Fig. 8-17 *Hotel - Custom Pitch Height tab of the Carousel NT driver*

Custom Pitch Height Definition panel

Custom Pitch Height #1 to #10

Specify the slot pitch height (the vertical distance in device steps between the bottoms of adjacent labware items) for up to 10 custom labware items which you want to use in the carousel. This information is required by the carousel feeder mechanism.

See also *Cartridge type* in 8.5.3.2 “Carousel NT Configuration - Hotel - Cartridge Configuration Tab”, 8-46.

8.5.3.4 Carousel NT Configuration - Barcode Settings Tab

The Barcode Settings tab is used to configure the barcode types which the carousel barcode scanner option will accept:

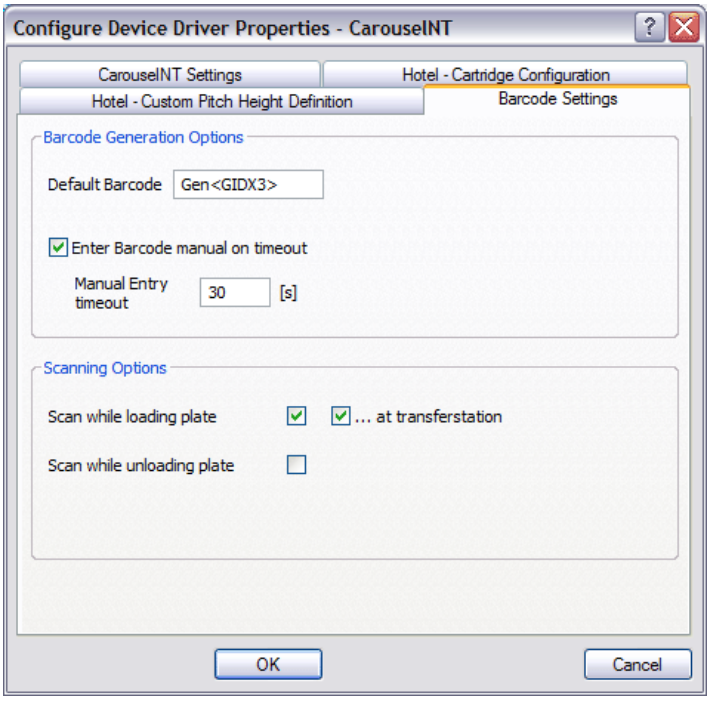


Fig. 8-18 *Barcode Settings tab of the Carousel NT driver*

Barcode Generation Options panel

Default Barcode

The following placeholders can be used in the *Default Barcode* field:

Tab. 8-5 *Placeholders for use in default barcodes*

Placeholder	Example	Description
<IDX> or <GIDX>	123	Counter
<IDX***n***> or <GIDX***n***>	004	Counter which is adjusted to a length of n digits using leading zeros

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text.

Example: Use the following string to generate default barcodes containing the string “Generated” and a 4-digit counter:

Generated<IDX4>

(e.g. Generated0003).

Example: Use the following string to generate default barcodes containing the string “Unreadable” and a counter:

Unreadable<IDX>

(e.g. Unreadable2)

Enter Barcode Manually on Timeout, Manual Entry Timeout

If you check *Enter Barcode Manually on Timeout*, the operator will be prompted to enter the barcode manually during process runtime if the scanner was unable to read it, despite retries. A default barcode will be used if the operator does not enter the barcode within the specified time (*Manual Entry Timeout* field).

If you do not check *Enter Barcode Manually on Timeout*, a default barcode will always be used if the scanner was unable to read it.

Scan while loading plate

Check this checkbox to scan the barcode when the labware is being loaded into the carousel.

... at transfer station

Check this checkbox to scan the barcode at the transfer position when the labware is being loaded into the carousel. In this case, it won't be scanned again when it reaches the cartridge (tower).

Scan while unloading plate

Check this checkbox to scan the barcode when the labware is being unloaded from the carousel.

8.5.4 Settings for the Hettich Centrifuge

This is used to configure settings for the Hettich Centrifuge. For general information on this device, see 16.5 "Commands for the Hettich Centrifuge", 16-16.

8.5.4.1 Hettich Centrifuge Configuration - Driver Tab

See 8.5.35 "Driver Tab of the Configure Device Driver Properties Dialog Box", 8-116.

8.5.4.2 Hettich Centrifuge Configuration - Settings Tab

The Settings tab is used to make general settings for the Hettich Centrifuge.

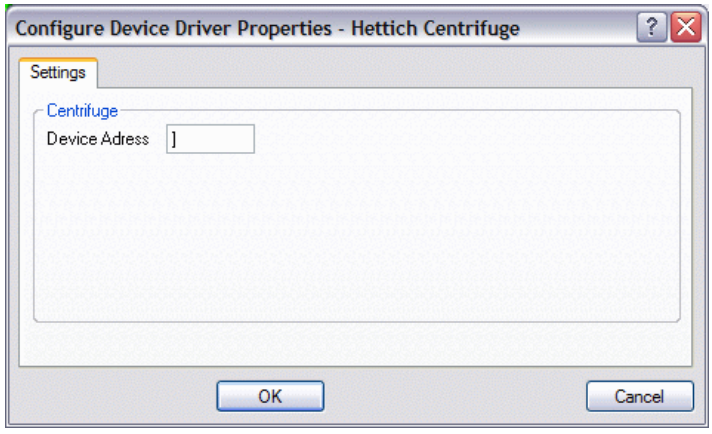


Fig. 8-19 *Settings tab of the Hettich Centrifuge driver*

Centrifuge panel

Device Address

Specify the hardware (device) address of the centrifuge. This setting is only relevant when daisy chaining several devices and should not normally be changed.

8.5.4.3 Hettich Centrifuge Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Hettich Centrifuge in the Test tab of the Configuration Tool:

ClearError <E00685>

Clears the error condition of the device. In case of an error the device will block until this command has been executed.

Close <S00640=0070>

Closes the door of the device.

Open <S00640=0060>

Opens the door of the device.

PosN <S00640=000N>

Moves the rotor into position N (1-4).

Status <E00640>

Requests the device status.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.5 Settings for the CNS (Common Notification Server)

This is used to make settings for the Common Notification Server. For general information on this device see A.12 “Common Notification Server (CNS)”, A-82.

8.5.5.1 CNS configuration - Driver tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.6 Settings for the Columbus Washer

This is used to configure settings for the Columbus Washer. For general information on this device, see 16.6 “Commands for the Columbus Washer”, 16-19.

8.5.6.1 Columbus Washer Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.6.2 Columbus Washer Configuration - Settings Tab

The Settings tab is used to make general settings for the Columbus washer.

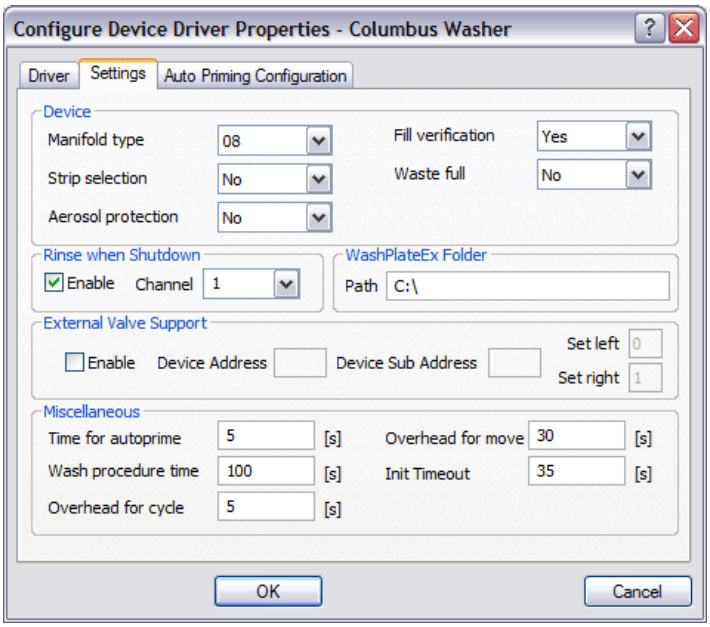


Fig. 8-20 *Settings tab of the Columbus Washer driver*

Device panel

Manifold type

Choose whether the washer is equipped with an 8, 12 or 16 way manifold.

Strip selection

Enable or disable the strip selection feature of the washer. If enabled, the strip of the microplate to be washed can be selected before the wash program is executed. A strip is a row or column of the microplate.

Aerosol protection

Specify whether the washer is equipped with the aerosol protection option. The aerosol protection option is a special manifold and pump to aspirate any aerosol vapors away from the microplate when it is washed.

Fill verification

Specify whether the washer is equipped with the fill verification option. The fill verification option checks whether the wash buffer was dispensed into each well during an overflow wash step (special manifold required).

Waste full detector

Specify whether the washer is equipped with the optional waste full sensor. The waste full sensor detects when the waste bottle becomes full and alerts the user.

Rinse when shutdown

Enable: Check this checkbox if you want the washer to carry out an automatic rinsing procedure when you shut down Freedom EVOware.

Channel: Choose the channel (liquid container) which contains the required rinsing liquid.

WashPlateEx folder

Path: Specify the required path for the WashPlateEx configuration file. The WashPlateEx configuration file is used by the WashPlateEx script command.

External Valve Support panel

Enable

Check this checkbox if you want to use an external two-way valve for liquid channel 4. This allows you to use five channels (liquid containers) with the washer instead of four. The external valve is intended for special applications.

Device Address

Specify the hardware address of the external valve. Specify the address as “address on the switch plus 1”. Each physical device (regardless of device type) must have a unique hardware address.

Device Sub Address

Specify the hardware sub-address of the external valve.

Set left, Set right

These settings control which input of the external valve is connected to which liquid container (4 or 5). Refer to the third-party supplier of the external valve for more information.

Miscellaneous panel

Time for autoprime

Specify the amount of time in seconds which is required by the automatic priming procedure. The washer is primed automatically each time you change the channel (liquid container).

Wash procedure time

Specify the amount of time in seconds which is required by one wash cycle.

Overhead for cycle

Specify the overhead time in seconds for each wash cycle.

Overhead for move

Specify the time in seconds which is required to move the washer manifold.

Note: *The execution time which Freedom EVOware uses for scheduling the wash procedure is calculated from the wash procedure time, overhead for cycle, overhead for move, soak time, final aspiration time and repetitions (the number of wash cycles). The latter three parameters are specified when you add the WashPlate command to your process.*

Init Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

8.5.6.3 Columbus Washer Configuration - Autopriming Tab

The Autopriming tab is used to configure settings for the auto-priming and auto-rinsing functions.

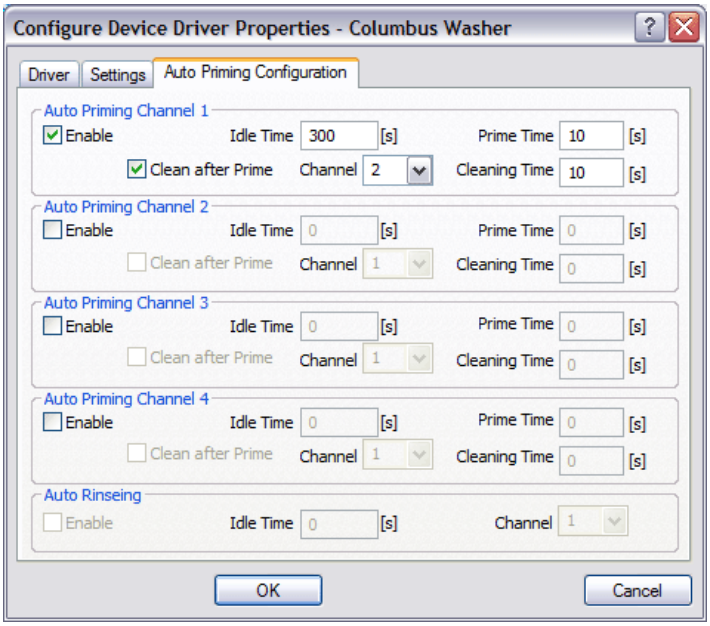


Fig. 8-21 *Auto Priming tab of the Columbus Washer driver*

Auto Priming Channel panels

Auto-priming is used to prime the washer the automatically if it has been left idle for a specified time. This can be done to prevent blockage of the needles, e.g. due to crystallization of the washing liquid.

Enable

Check this checkbox if you want to activate the auto-priming procedure using the selected channel (liquid container).

Idle Time

Specify how long to wait when the washer is idle before starting the auto-priming procedure.

Prime Time

Specify how long to carry out the priming procedure.

Clean after prime

Check this checkbox if you want to clean the washer after priming.

Channel

Choose the channel (liquid container) which contains the required cleaning liquid.

Cleaning time

Specify how long to carry out the cleaning procedure.

Auto Rinsing Channel panel

Auto-rinsing is used to rinse the washer the automatically if it has been left idle for a specified time. Rinsing takes place using soak mode (see 16.6.3 “Columbus Washer- Rinse Command”, 16-23).

Enable

Check this checkbox if you want to activate the auto-rinsing procedure. You can only activate auto-rinsing if you have not activated auto-priming.

Idle Time

Specify how long to wait when the washer is idle before starting the auto-rinsing procedure.

Channel

Choose the channel (liquid container) which contains the required rinsing liquid.

8.5.6.4 Columbus Washer Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Columbus washer in the Test tab of the Configuration Tool:

Remote <Y0>

This firmware command switches the device from local mode to remote mode. The device can only be controlled remotely by Freedom EVOware (through the interface cable) in remote mode.

Exit Remote <E>

This firmware command switches the device from remote mode to local mode. The device can not be controlled remotely by Freedom EVOware (through the interface cable) in local mode.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.7 Settings for the FlaskFlipper

This is used to make settings for the Flask Flipper. For general information on this device, see 16.7 “Commands for the FlaskFlipper”, 16-29.

8.5.7.1 FlaskFlipper Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.7.2 FlaskFlipper Configuration - Settings Tab

The Settings tab is used to make general settings for the Flask Flipper.

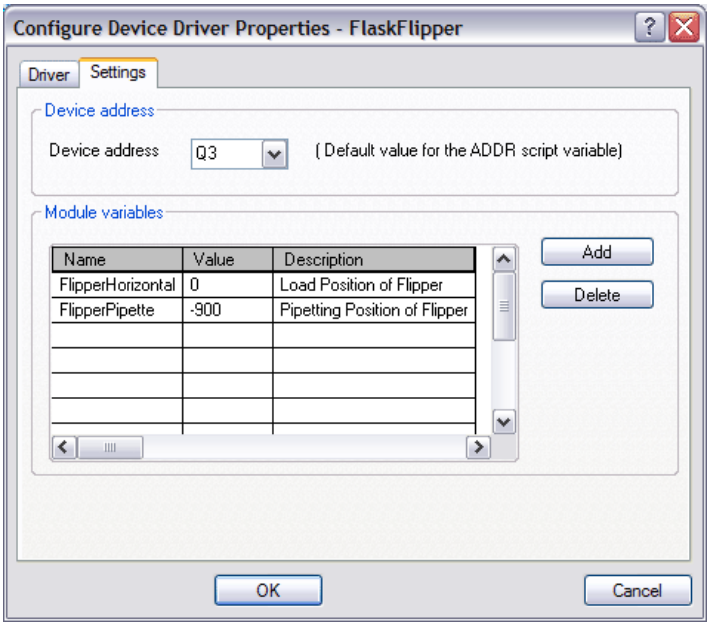


Fig. 8-22 *Settings tab of the Flask Flipper driver*

Device Address panel

Device Address

Specify the hardware address of the Flask Flipper. Specify the address as “address on the switch plus 1” (default: Q3). Each physical device (regardless of device type) must have a unique hardware address.

Module Variables panel

Name

Parameter name. This field cannot be edited.

Value

FlipperHorizontal: Required rotary position of the flipper hardware when the flasks are loaded or unloaded, in 0.1° (default: 0, horizontal).
FlipperPipette: Required rotary position of the flipper hardware when pipetting into the flasks, in 0.1° (default: -900, vertical).

Description

Parameter description. This field cannot be edited.

8.5.8 Settings for Heated Incubators 1 to 3

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place. The heated incubator can be fitted with a shaker option.

Freedom EVOware distinguishes between physical and logical incubators. A physical incubator is the device you place on the worktable of your instrument. A logical incubator is a group of incubator slots which are configured for the same

incubating temperature. The group of slots can all lie within the same physical incubator or can extend over more than one physical incubator. In the latter case, all of the physical incubators must have the same number of slots (4 or 6).

The Settings tab is used to configure the currently selected logical incubator. For each of the logical incubators you want to use (Incubator1, Incubator2 and Incubator3), you must specify the physical incubators (“towers”) which it uses and the first slot of the first tower which is used.

For additional information on this device, see 16.10 “Commands for the Heated Incubator”, 16-39.

8.5.8.1 Heated Incubator Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.8.2 Heated Incubator Configuration - Settings Tab

The Settings tab is used to make general settings for the currently selected logical incubator (Incubator1, Incubator2 or Incubator3).

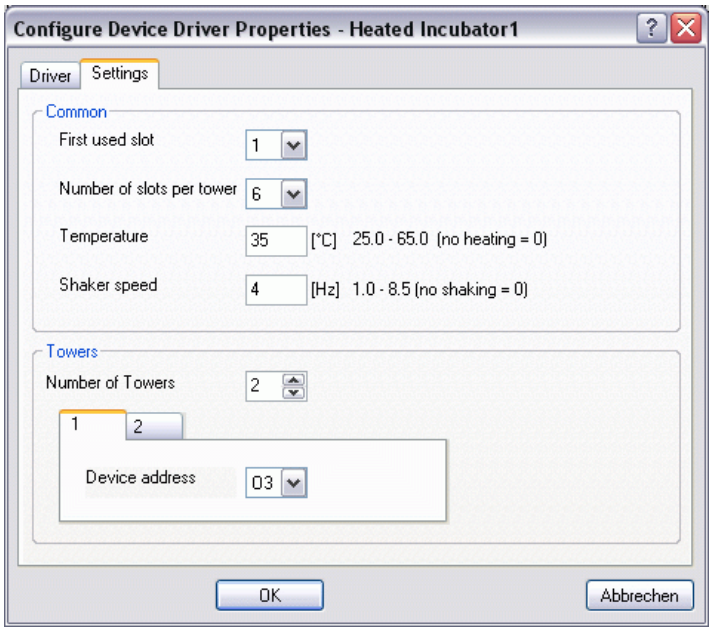


Fig. 8-23 *Settings tab of the Incubator driver*

Common panel

First used slot

Choose the first slot that this logical incubator uses. Slots are counted from top to bottom. The first used slot is one of the slots in the first physical incubator which is used by this logical incubator (tower 1 in the Towers panel).

Note: *Slots are counted from top to bottom. When teaching robot vectors for the incubator, teach slot 1 (the top slot) and then teach the vertical offset of the slots. To ensure the correct assignment of slot numbers to slot temperatures, always teach from slot 1 downwards and not from the bottom slot upwards.*

Number of slots per tower

Choose the number of slots which are available per physical incubator (4 or 6). If the logical incubator extends over more than one physical incubator, all of them must have the same number of slots.

Temperature

Specify the temperature of the logical incubator (range, model MIO1: 25° to 47°C; range, model MIO2: 25° to 65°C). The same temperature is used for all of the slots of the logical incubator. Specify 0 to disable the heater. To ensure that the incubator reaches and maintains a stable temperature, make sure that the incubator doors are not left open.

Note: *For special applications, you can use the SetTemperature command to assign a different temperature to individual slots during script or process runtime.*

Shaker speed

Specify the speed at which the labware should be shaken during incubation (range, model MIO1: 1 to 10.5 Hz; range, model MIO2: 1 to 8.5 Hz). Specify 0 to disable shaking. Shaking requires the incubator shaker option.

Towers panel

Number of Towers

Choose how many physical incubators are used by this logical incubator (maximum 8). Depending on your choice, additional tabs will appear (1, 2, 3 etc.).

Device address

For each of the Towers tabs (physical incubators), choose the device address which is associated with this logical incubator. Choose the address as “hardware address plus 1”. On heated incubators, the hardware address is set with the blue address switch at the back. Each physical device (regardless of device type) must have a unique hardware address.

Examples

Example 1: Two logical incubators (Incubator1, Incubator2) each have three slots and share the same physical incubator (tower 1). Incubator1 starts at slot 1 (the topmost slot) and has a temperature of 35 °C; Incubator2 starts at slot 4 and has a temperature of 40 °C.

Example 2: One logical incubator has 7 slots and starts at slot 4 of tower 1. The last used slot is then slot 3 of tower 2.

Additional settings in the configuration file for the incubator driver

Two of the parameters in the [Settings] section of the configuration file for the incubator driver allow you to adjust the warning level if the incubator temperature differs from the configured value.

- The configuration file is located in the Freedom EVOware installation directory and has the name Te-Incubator1.ini (for the first heated incubator) to Te-Incubator3.ini (for the third heated incubator).
- The parameter *TempRange* specifies the threshold for the warning. The incubator driver interrogates the actual incubator temperature once per minute and a warning is output if the temperature differs from the configured temperature by more than the specified range (either hotter or colder). *TempRange* is specified as an unsigned integer in °C.
- The parameter *TempWarnDelay* specifies a time delay after inserting the labware in the incubator and before the first warning is output. This allows

time for the incubator temperature to stabilize. *TempWarnDelay* is specified as an unsigned integer in seconds.

Note: *Freedom EVOware must be re-started (and the drivers unloaded) for the changes to take effect.*

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing this file, you will be warned that the checksum is invalid. Proceed as follows to repair the checksum:

- Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned again that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see A.9.2 “Validate Configuration Tool”, A-36).

8.5.9 Settings for the Base Incubator

This is used to make settings for the Base Incubator. For general information on this device, see 16.11 “Commands for the Base Incubator”, 16-44.

8.5.9.1 Base Incubator Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.9.2 Base Incubator Configuration - Settings Tab

The Settings tab is used to make general settings for the base incubator:

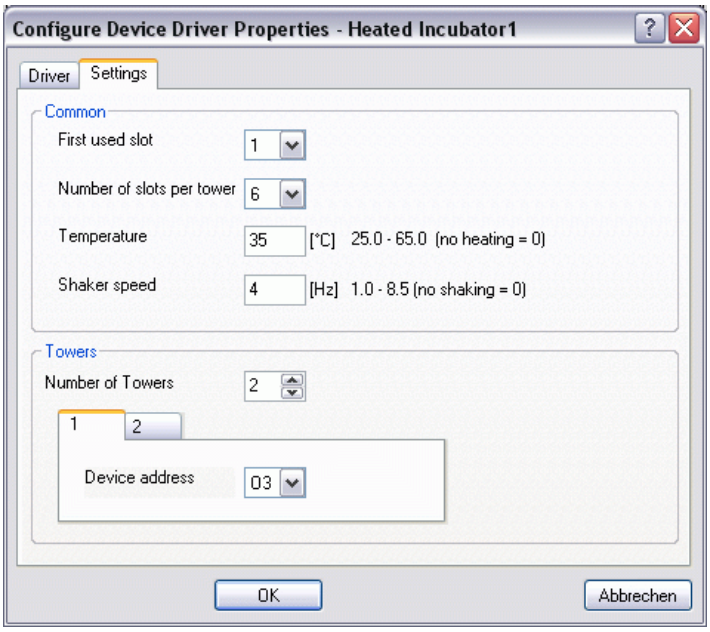


Fig. 8-24 *Settings tab of the Base Incubator driver*

General panel

Positions

Specify the number of positions available for keeping labware at room temperature.

Resources

This parameter is not configurable.

Variables panel

There are no configurable parameters in this panel.

8.5.10 Settings for the Room Temperature Incubator

This is used to make settings for the Room Temperature Incubator. For general information on this device, see 16.12 “Commands for the Room Temperature Incubator”, 16-45.

Note: *The same dialog box is used for the Base Incubator settings (see 8.5.9 “Settings for the Base Incubator”, 8-58).*

Note: *See 8.5.33 “Settings for the Transfer Station”, 8-113 for information on configuring the Transfer Station.*

8.5.10.1 Room Temperature Incubator Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.10.2 Room Temperature Incubator Configuration - Settings Tab

The Settings tab is used to make general settings for the room temperature incubator:

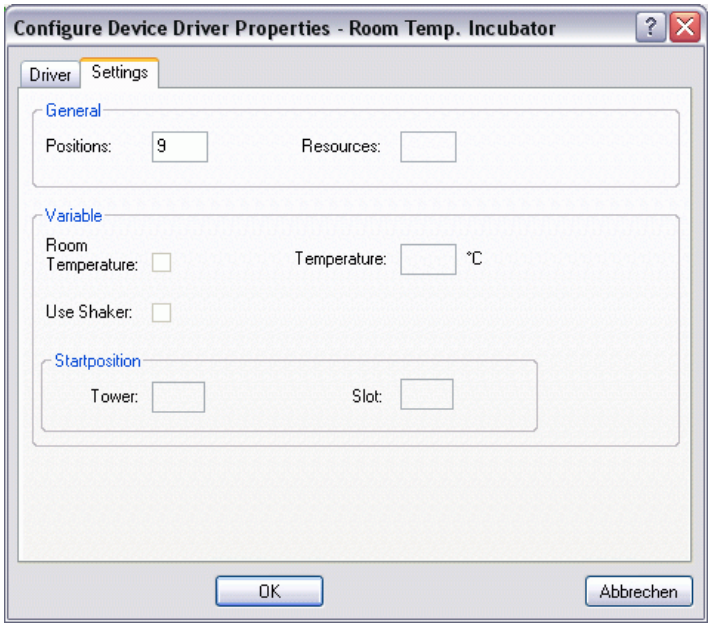


Fig. 8-25 *Settings tab of the Room Temperature Incubator driver*

General panel

Positions

Specify the number of positions available for keeping labware at room temperature.

Resources

This parameter is not configurable.

Variables panel

There are no configurable parameters in this panel.

8.5.11 Settings for the Liquid Handling Arm (LiHa)

This is used to make settings for the Liquid Handling Arm. For general information on this device, see 16.13 “Commands for the Liquid Handling Arm”, 16-46.

8.5.11.1 Liquid Handling Arm Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.11.2 Liquid Handling Arm Configuration - Settings Tab

The Settings tab is used to make general settings for the Liquid Handling Arm.

Note: *See 8.5.32 “Settings for the Process Script”, 8-111 for information on configuring the Process Script driver.*

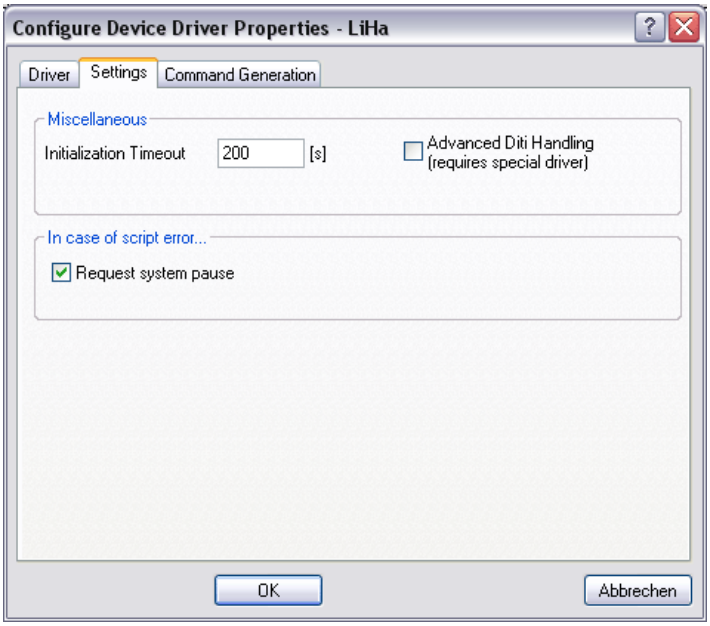


Fig. 8-26 *Settings tab of the Liquid Handling Arm driver*

Miscellaneous panel

Initialization timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Advanced DITI handling

Check this checkbox if you want to use to use a special driver for exchanging DITIs. The special driver is not provided with the standard Freedom EVOware installation.

In case of script error panel

Request system pause

Check this checkbox if you want the driver to request a system pause if a script error is detected during command execution.

Note: *Do not confuse the settings made here with those made in the scheduling/ error handling configuration. The settings in this tab define the reaction of the system if the Liquid Handling Arm outputs an error message during execution of a pipetting command. The settings for error handling take effect if the pipetting command has already been stopped due to an error.*

8.5.11.3 Liquid Handling Arm Configuration - Command Generation Tab

The Command Generation tab is used to make settings for the default pre-actions and post-actions to be used when generating commands for the Liquid Handling Arm. The settings are only relevant to Freedom EVOware Plus.

Note: *See 8.5.32 “Settings for the Process Script”, 8-111 for information on configuring the Process Script driver.*

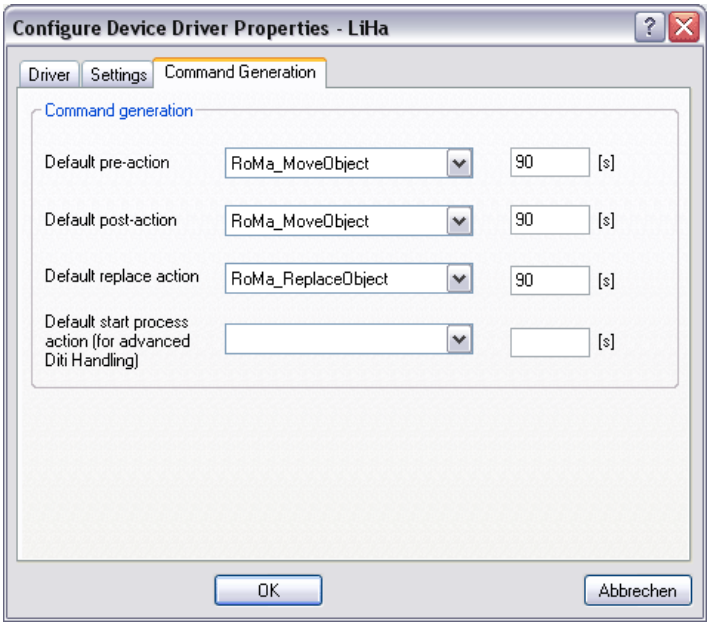


Fig. 8-27 *Command Generation tab of the Liquid Handling Arm driver*

Command Generation panel

Default pre-action
Choose the default pre-action to be used by Liquid Handling Arm commands and specify the execution time to be used when scheduling this operation.

Default post-action
Choose the default post-action to be used by Liquid Handling Arm commands and specify the execution time to be used when scheduling this operation.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each labware item which needs to be moved, it then uses the specified pre-action and post-action to create and configure the RoMa movements which will be needed.*

Default replace action
Choose the default action to be used by Liquid Handling Arm commands when replacing DITIs and specify the execution time to be used when scheduling this operation.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each DITI rack, it then uses the specified replace action to create and configure the RoMa movements which will be needed when the DITI rack needs to be replaced.*

Default start process action for advanced DITI handling
If you are using a special driver for exchanging DITIs, specify the execution time to be used when scheduling this operation. The special driver is not provided with the standard Freedom EVOware installation.

8.5.11.4 Liquid Handling Arm Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Liquid Handling Arm in the Test tab of the Configuration Tool:

Get RSP <GET_RSP>
Requests the pipetting instrument type the device is connected to.

Get VERSION <GET_VERSION>
Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

Initialize System <INIT_RSP>
Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.12 Settings for the MCA96 (Multi Channel Arm 96)

This is used to make settings for the MCA96. For general information on this device, see 15.68 “MCA96 Commands”, 15-159.

8.5.12.1 MCA96 Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.12.2 MCA96 Configuration - Settings Tab

The Settings tab is used to make general settings for the MCA96:

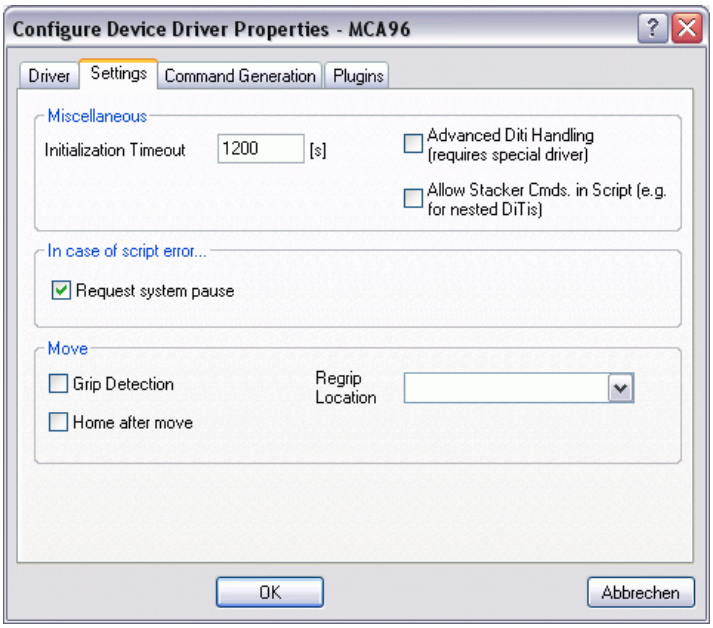


Fig. 8-28 *Settings tab of the MCA96 driver*

Miscellaneous panel

Initialization timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Advanced DITI handling

This checkbox is not relevant for the MCA96 and should be ignored.

Allow stacker commands in script

This setting is only relevant for Freedom EVOware Plus. When you create a pipetting script for the MCA96 in an MCA96 Pipette process step, the Commands section of the Control Bar only shows relevant and/or permissible script commands. Te-Stack commands are not shown because stacker actions are normally part of a robot move or programmed using a separate Te-Stack process step. Check this checkbox to show Te-Stack commands in the Control Bar when you create a pipetting script for the MCA96. This is intended for special applications, above all for getting nested DITIs for the MCA96 from the stacker. The Te-Stack commands are only shown if you have installed the Te-Stack driver.

In case of script error panel

Request system pause
Check this checkbox if you want the driver to request a system pause if a script error is detected during command execution.

Move panel

Grip Detection
Specify whether grip detection should be used.

Home after move
Specify whether the MCA96 should be moved to its home position after each move. This may be necessary for some worktable layouts, but will reduce system performance.

Regrip location
This setting is analogous to the regrip location for the RoMa. See 8.5.23.2 “Plate Robot Configuration - Settings Tab”, 8-86, Regrip location.

8.5.12.3 MCA96 Configuration - Command Generation Tab

The Command Generation tab is used to make settings for the default pre-actions and post-actions to be used when generating commands for the Multi Channel Arm. The settings are only relevant to Freedom EVOware Plus.

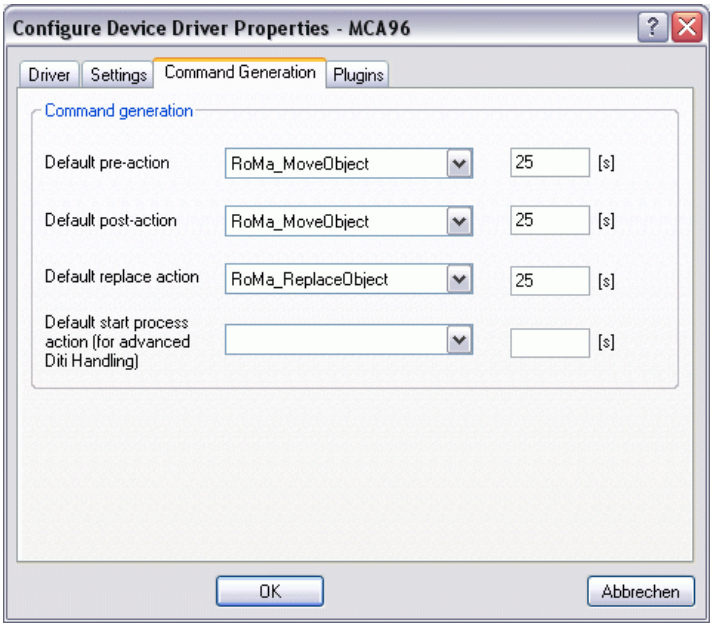


Fig. 8-29 *Command Generation tab of the MCA96 driver*

Command Generation panel

Default pre-action
Choose the default pre-action to be used by Liquid Handling Arm commands and specify the execution time to be used when scheduling this operation.

Default post-action
Choose the default post-action to be used by Liquid Handling Arm commands and specify the execution time to be used when scheduling this operation.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each labware item which needs to be moved, it then uses the specified pre-action and post-action to create and configure the RoMa movements which will be needed.*

Default replace action

Choose the default action to be used by Liquid Handling Arm commands when replacing DITIs and specify the execution time to be used when scheduling this operation.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each DITI rack, it then uses the specified replace action to create and configure the RoMa movements which will be needed when the DITI rack needs to be replaced.*

Default start process action for advanced DITI handling

This field is not relevant for the MCA96 and should be ignored.

8.5.12.4 MCA96 Configuration - Plugins Tab

Plugins are software tools from third-party suppliers which are used to control special devices. The Plugins tab is used to assign the MCA96 commands which are needed by the device.

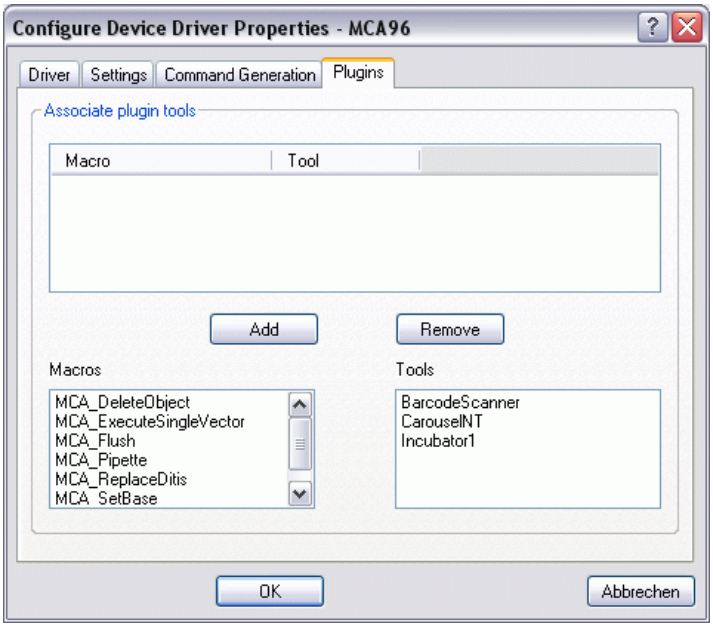


Fig. 8-30 *Plugins tab of the MCA96 driver*

Associate Plugin Tools panel

Choose the plugin in the Tools panel, choose the MCA96 command which the device should use and click Add.

8.5.12.5 MCA96 Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the MCA96 in the Test tab of the Configuration Tool:

Get RSP <GET_RSP>

Requests the pipetting instrument type the device is connected to.

Get VERSION <GET_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

Initialize System <INIT_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.13 Settings for the MCA384 (Multi Channel Arm 384)

This is used to make settings for the MCA384. For general information on this device, see 15.69 “MCA384 Commands”, 15-179.

8.5.13.1 MCA384 Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.13.2 MCA384 Configuration - Settings Tab

The Settings tab is used to make general settings for the MCA384:

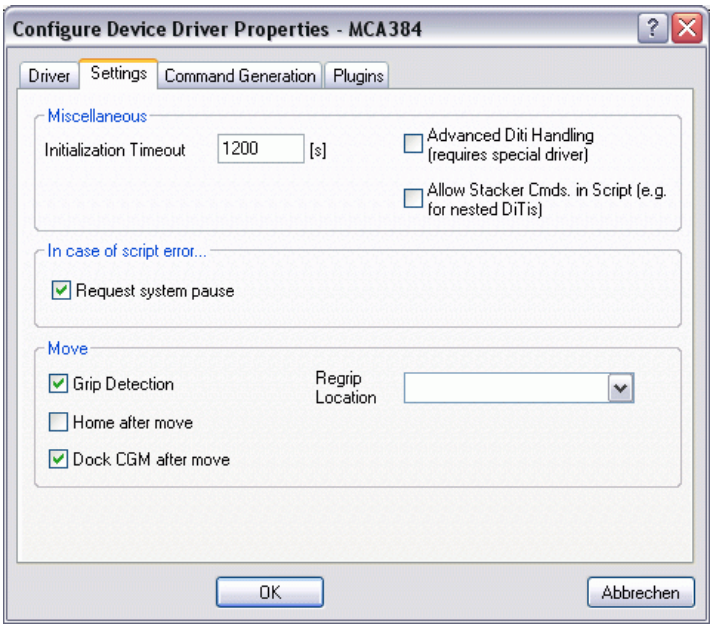


Fig. 8-31 *Settings tab of the MCA384 driver*

Miscellaneous panel

Initialization timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Advanced DITI handling

This checkbox is not relevant for the MCA384 and should be ignored.

Allow stacker commands in script

This setting is only relevant for Freedom EVOware Plus. When you create a pipetting script for the MCA384 in an MCA384 Pipette process step, the Commands section of the Control Bar only shows relevant and/or permissible script commands. Te-Stack commands are not shown because stacker actions are normally part of a robot move or programmed using a separate Te-Stack process step. Check this checkbox to show Te-Stack commands in the Control Bar when you create a pipetting script for the MCA384. This is intended for special applications, above all for getting nested DITIs for the MCA384 from the stacker. The Te-Stack commands are only shown if you have installed the Te-Stack driver.

In case of script error panel

Request system pause

Check this checkbox if you want the driver to request a system pause if a script error is detected during command execution.

Move panel

Grip Detection

Specify whether grip detection should be used.

Home after move

Specify whether the MCA384 should be moved to its home position after each move. This may be necessary for some worktable layouts, but will reduce system performance.

Regrip location

This setting is analogous to the regrip location for the RoMa. See 8.5.23.2 “Plate Robot Configuration - Settings Tab”, 8-86, Regrip location.

Dock CGM after move

This setting is only relevant for Freedom EVOware Plus. In Freedom EVOware Standard, the CGM can be docked and undocked using script commands.

The CGM (common gripper module) is a hardware option for the MCA384 which can be used to pick up and move labware. The CGM can only be used for gripping and moving labware when it is undocked.

If sufficient space is available on the worktable, the CGM can be kept permanently undocked to avoid the time needed for undocking when the CGM is used. This speeds up commands which use the CGM.

Check this checkbox if you want to automatically dock the CGM again after using it. In this case, it will be undocked automatically before it is used and docked again when the operation is finished. Docking reduces the amount of space required by the MCA384/CGM hardware in the X direction.

If you do not check this checkbox, the CGM is normally kept permanently undocked. If it has been docked by a previous operation for some reason, it will be undocked before it is used.

To optimize the speed of more complex operations, you can leave the checkbox unchecked and specify a MCA384_DockCGM command as a pre-action or post action to the last MCA384 movement command before carrying out the pipetting sequence.

To dock the CGM, the gripper fingers are lowered below the MCA384 pipetting head, opened completely and rotated until they point to the left. The grippers are then raised again until the pipetting head is positioned centrally between the fingers. When docked, the CGM always moves together with the pipetting head, and the pipetting head can be moved as if the CGM is not mounted. Tip: You can test and view docking and undocking using the 3D simulator EVOSim.

8.5.13.3 MCA384 Configuration - Command Generation Tab

The Command Generation tab is used to make settings for the default pre-actions and post-actions to be used when generating commands for the MCA384. The settings are only relevant to Freedom EVOware Plus.

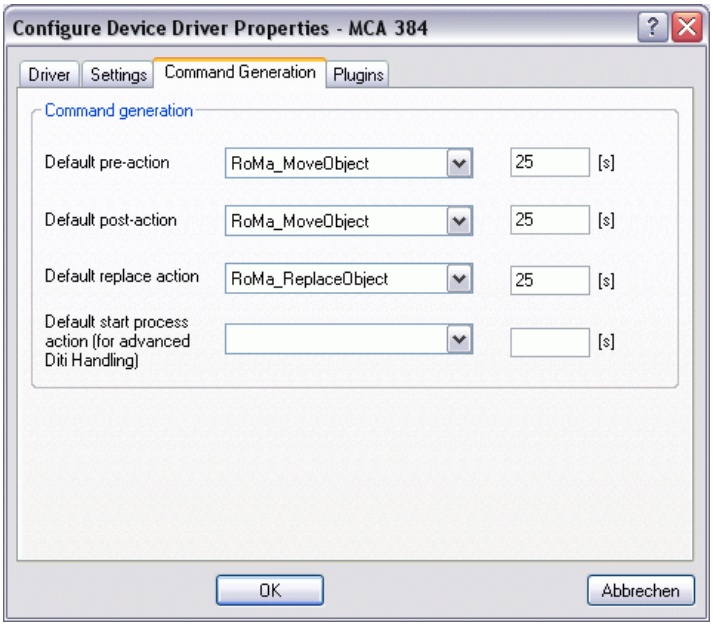


Fig. 8-32 *Command Generation tab of the MCA384 driver*

Command Generation panel

Default pre-action

Choose the default pre-action to be used by Liquid Handling Arm commands and specify the execution time to be used when scheduling this operation.

Default post-action

Choose the default post-action to be used by Liquid Handling Arm commands and specify the execution time to be used when scheduling this operation.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each labware item which needs to be moved, it then uses the specified pre-action and post-action to create and configure the RoMa movements which will be needed.*

Default replace action

Choose the default action to be used by Liquid Handling Arm commands when replacing DITIs and specify the execution time to be used when scheduling this operation.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each DITI rack, it then uses the specified replace action to create and configure the RoMa movements which will be needed when the DITI rack needs to be replaced.*

Default start process action for advanced DITI handling

This field is not relevant for the MCA384 and should be ignored.

8.5.13.4 MCA384 Configuration - Plugins Tab

Plugins are software tools from third-party suppliers which are used to control special devices. The Plugins tab is used to assign the MCA384 commands which are needed by the device.

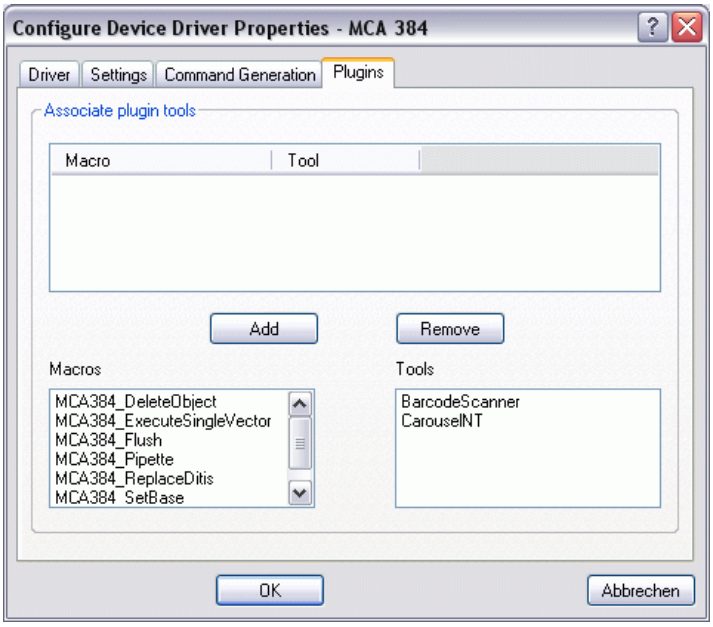


Fig. 8-33 *Plugins tab of the MCA384 driver*

Associate Plugin Tools panel

Choose the plugin in the Tools panel, choose the MCA384 command which the device should use and click Add.

8.5.13.5 MCA384 Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the MCA384 in the Test tab of the Configuration Tool:

Get RSP <GET_RSP>

Requests the pipetting instrument type the device is connected to.

Get VERSION <GET_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

Initialize System <INIT_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.14 Settings for the Magellan Driver

This is used to make settings for the Tecan Magellan software option. The Magellan software is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. The Magellan software, which has its own installation procedure, has built-in drivers for Tecan microplate readers. If you intend to use the Magellan software, it is not necessary to install the reader driver when you install Freedom EVOware.

For additional information on this device, see 16.16 “Commands for the Magellan option”, 16-48.

8.5.14.1 Magellan Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.14.2 Magellan Configuration - Settings Tab

The Settings tab is used to make general settings for the Magellan driver.

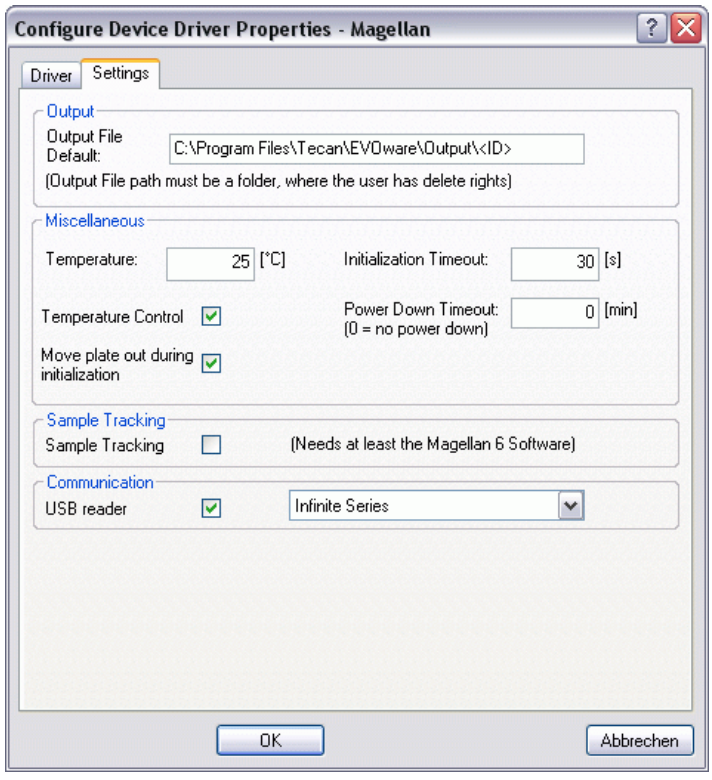


Fig. 8-34 *Settings tab of the Magellan driver*

Output File Default

Specify the required default filename and path for the calculated results (workspace file) from the Magellan software. The default filename and path which you specify here will then be shown in the dialog box of the Magellan Measure command (see 16.16.6 “Magellan - Measure Command”, 16-49).

Magellan Standard

Path: Specify the path which is configured in Magellan for workspace files. This makes it easier to load the generated workspace files if you run Magellan on its own later on.

Filename: If you are using a barcode scanner, you should specify the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. It is not necessary to specify the file extension (which is .wsp). Note: The labware must be scanned in advance of the Magellan Measure command.

Examples:

c:\Documents and Settings\All Users\Documents\Tecan\Magellan\<ID>

or

c:\Documents and Settings\All Users\Documents\Tecan\Magellan\wsp\<ID>

Note: *To check the paths which are configured in Magellan, start the Magellan Wizard, click More and click Options. Then choose the Paths tab.*

Magellan Tracker

Path: Magellan Tracker stores the workspace files in the path which is configured in Magellan and ignores the path that you specify here. Accordingly, it is recommended to leave the Output File Default field blank for Magellan Tracker. The filename and path of the workspace file will then be taken from the settings which were made in the Magellan method.

Filename: If you are using a barcode scanner, you should specify the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. It is not necessary to specify the file extension (which is .wsp). Note: The labware must be scanned in advance of the Magellan Measure command.

Example:

c:\Documents and Settings\All Users\Documents\Tecan\Magellan\wsp\<ID>

Note: *In both Magellan Standard and Magellan Tracker, if you leave the Output File Default field blank in Freedom EVOware, the filename and path of the workspace file will be taken from the settings which were made in the Magellan method.*

Note: *In Windows Explorer, the directory c:\Documents and Settings\All Users\Documents is shown as "Shared Documents" and not "Documents".*

Miscellaneous panel

Temperature, Temperature Control

Check the *Temperature Control* checkbox if you want to carry out measurements at a specified temperature. Then specify the required temperature in the *Temperature* field.

Initialization Timeout

Specify the maximum duration of the reader initialization procedure. An error message will be output if initialization is not completed within this time.

Power Down Timeout

Specify the delay after which the reader should go into standby (energy saving) mode. Specify 0 if you do not want the reader to go into standby mode. The reader can take several minutes to wake up from standby mode before it is ready for use.

Move plate out during initialization

Check this checkbox if you want to move out the labware during the initialization procedure.

Sample Tracking panel

Sample Tracking

Check the *Sample Tracking* checkbox if you are also using the Tecan software option Freedom EVOware Sample Tracking. This allows Freedom EVOware to exchange labware and sample barcodes and Magellan result data with the Sample Tracking software package. Do not check this checkbox if you are not using Freedom EVOware Sample Tracking.

Communication panel

USB reader

Check the *USB reader* checkbox and choose the reader type if the reader is connected to the PC via USB.

8.5.15 Settings for the PW384 Washer

This is used to make settings for the PW384 microplate washer. For general information on this device, see 16.17 “Commands for the PW384 Washer”, 16-51.

8.5.15.1 PW384 Washer Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.15.2 PW384 Washer Configuration - Settings Tab

The Settings tab is used to make general settings for the PW384 Plate Washer.

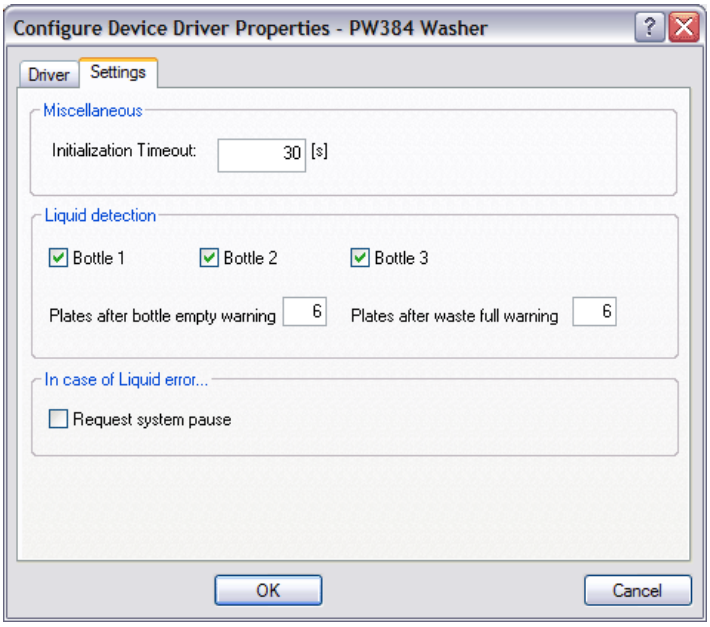


Fig. 8-35 *Settings tab of the PW384 Washer driver*

Miscellaneous panel

Initialization Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Liquid detection panel

Bottle1/2/3

Check the checkboxes if you want to activate liquid detection for the wash liquid bottles.

Plates after bottle empty warning

If the liquid detection signals an empty wash liquid bottle, specify how many plates can still be washed before trigerring an error.

Plates after waste full warning

If the liquid detection signals a full waste bottle, specify how many plates can still be washed before trigerring an error.

In case of liquid error panel

Request system pause

Check this box if you want the driver to request a system pause if the washer detects a liquid error during command execution.

Note: *Do not confuse the settings made here with those made in the scheduling/ error handling configuration. The settings in this tab define the reaction of the system if the washer outputs an error message during execution of a washer command. The settings for error handling take effect if the washer command has already been stopped due to an error.*

8.5.16 Settings for the PW384GP Washer

This is used to make settings for the PW384GP microplate washer. For general information on this device, see 16.18 “Commands for the PW384GP Washer”, 16-54.

8.5.16.1 PW384GP Washer Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.16.2 PW384GP Washer Configuration - Settings Tab

The Settings tab is used to make general settings for the PW384 Plate Washer.

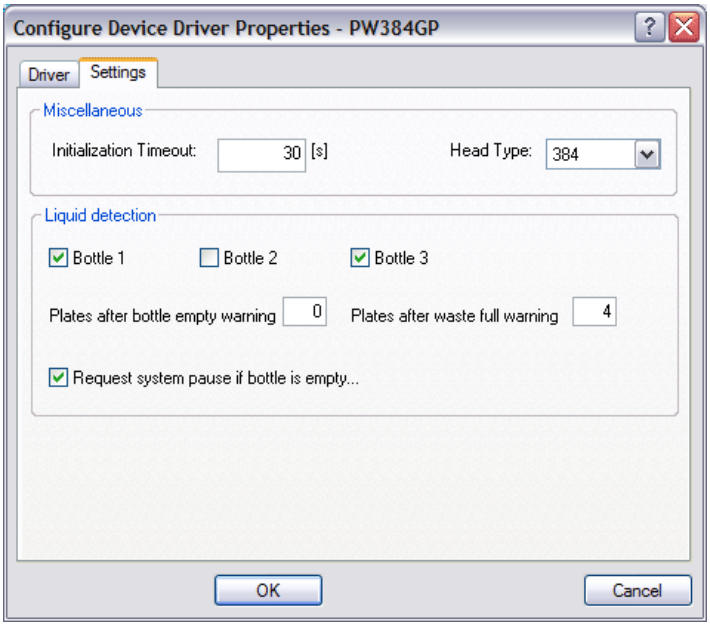


Fig. 8-36 *Settings tab of the PW384GP Washer driver*

Miscellaneous panel

Initialization Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Head type

Choose the wash head type which is fitted to the washer (96 needle or 384 needle).

Liquid detection panel

Bottle1/2/3

Check the checkboxes if you want to activate liquid detection for the wash liquid bottles.

Plates after bottle empty warning

If the liquid detection signals an empty wash liquid bottle, specify how many plates can still be washed before trigerring an error.

Plates after waste full warning

If the liquid detection signals a full waste bottle, specify how many plates can still be washed before trigerring an error.

Request system pause if botle is empty

Check this box if you want the driver to request a system pause if the washer detects a liquid error during command execution.

Note: *Do not confuse the settings made here with those made in the scheduling/ error handling configuration. The settings in this tab define the reaction of the system if the washer outputs an error message during execution of a washer command. The settings for error handling take effect if the washer command has already been stopped due to an error.*

8.5.17 Settings for the 96PW Washer

This is used to make settings for the 96PW microplate washer. For general information on this device, see 16.19 “Commands for the 96PW Washer”, 16-65.

8.5.17.1 96PW Washer Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.17.2 96PW Washer Configuration - Settings Tab

The Settings tab is used to make general settings for the 96PW Plate Washer.

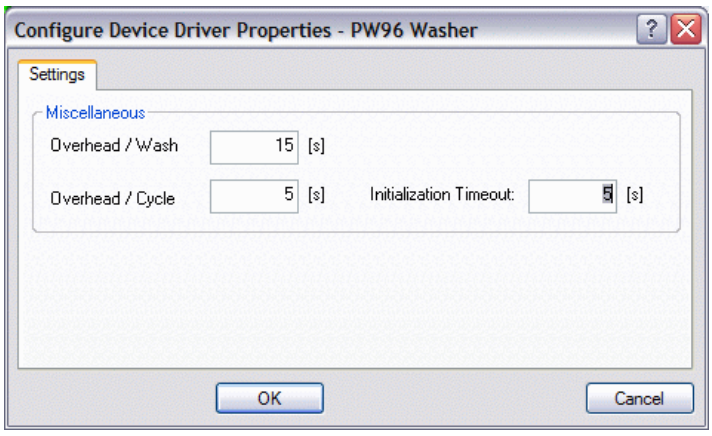


Fig. 8-37 *Settings tab of the 96PW Washer driver*

Miscellaneous panel

Overhead / Wash

Specify the global overhead time to be used when calculating command execution times.

Overhead / Cycle

Specify the overhead time per cycle to be used when calculating command execution times.

Initialization Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

8.5.17.3 96PW Washer Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the 96PW Washer in the Test tab of the Configuration Tool:

Remote <Y0>

This firmware command switches the device from local mode to remote mode. The device can only be controlled remotely by Freedom EVOware (through the interface cable) in remote mode.

Exit Remote <E>

This firmware command switches the device from remote mode to local mode. The device can not be controlled remotely by Freedom EVOware (through the interface cable) in local mode.

Prime <M>

Prime the washer.

Exit Command Mode <E>

Exit command mode.

Query Status <Q>

Query the status.

These commands correspond to the driver commands described in 16.19 “Commands for the 96PW Washer”, 16-65 and perform the actions described there. Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.18 Settings for the Tube Robot (PnP)

This is used to make settings for the Tube Robot driver. For general information on this device, see 16.25 “Commands for the Tube Robot”, 16-83.

8.5.18.1 Tube Robot Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.18.2 Tube Robot Configuration - Settings Tab

The Settings tab is used to make general settings for the Tube Robot:

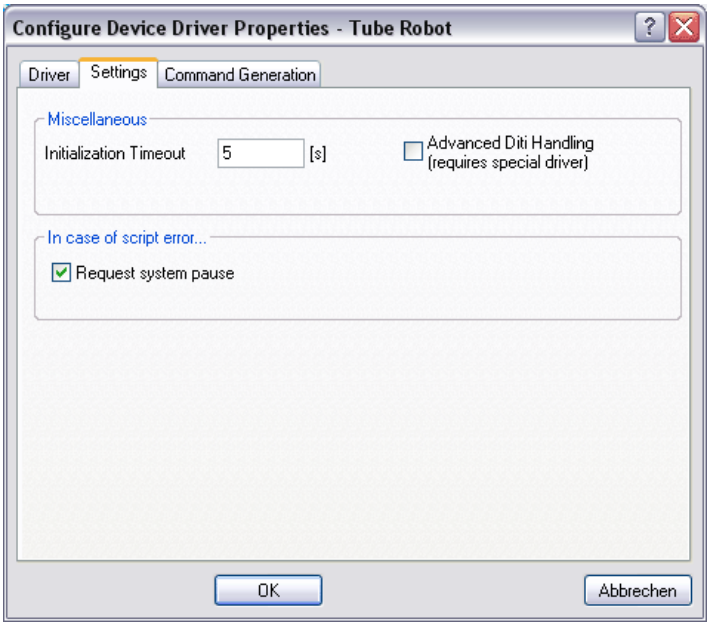


Fig. 8-38 *Settings tab of the Tube Robot driver*

Miscellaneous panel

Initialization Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Advanced DITI handling

This checkbox is not relevant for the tube robot and should be ignored.

In case of script error panel

Request system pause

Check this checkbox if you want the driver to request a system pause if a script error is detected during command execution.

8.5.18.3 Tube Robot Configuration - Command Generation Tab

The Command Generation tab is used to make settings for the default pre-actions and post-actions to be used when generating commands for the tube robot (PnP). The settings are only relevant to Freedom EVOware Plus.

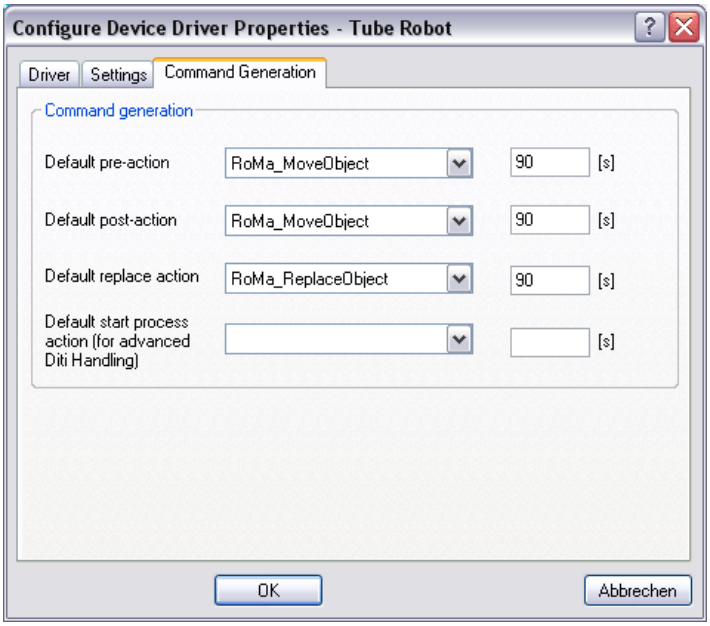


Fig. 8-39 *Command Generation tab of the Tube Robot driver*

Command Generation panel

Default pre-action

Choose the default pre-action to be used by tube robot commands and specify the execution time to be used when scheduling this operation.

Default post-action

Choose the default post-action to be used by tube robot commands and specify the execution time to be used when scheduling this operation.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each labware item which needs to be moved, it then uses the specified pre-action and post-action to create and configure the RoMa movements which will be needed. This feature only creates movement commands for the RoMa; it does not create movement commands for the PnP.*

Default replace action

Choose the default action to be used by tube robot commands when replacing DITIs and specify the execution time to be used when scheduling this operation.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each DITI rack, it then uses the specified replace action to create and configure the RoMa movements which will be needed when the DITI rack needs to be replaced. This feature only creates movement commands for the RoMa; it does not create movement commands for the PnP.*

Default start process action for advanced DITI handling

This field is not relevant for the the tube robot and should be ignored.

8.5.18.4 Tube Robot Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the PnP in the Test tab of the Configuration Tool:

Get RSP <GET_RSP>

Requests the pipetting instrument type the device is connected to.

Get VERSION <GET_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

Initialize System <INIT_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.19 Settings for the PosID-3

This is used to make settings for the PosID-3 driver. For general information on this device, see 16.20 “Commands for the PosID-3”, 16-70.

8.5.19.1 PosID-3 Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.19.2 PosID-3 Configuration - Settings Tab

The Settings tab is used to make general settings for the PosID-3:

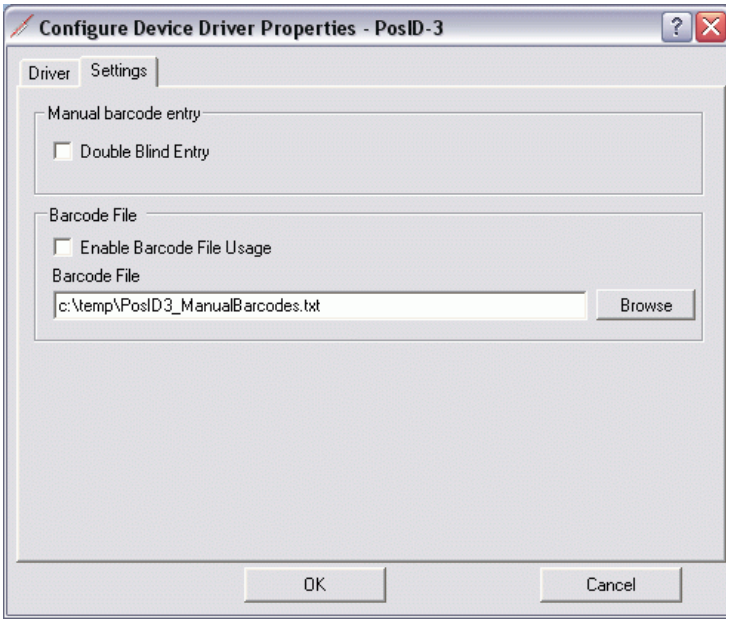


Fig. 8-40 *Settings tab of the PosID-3 driver*

Manual Barcode Entry panel

Double Blind Entry

Check this checkbox if you want to activate double blind entry. In this case, you will be prompted to enter the barcode twice manually during script or process runtime if the scanner was unable to read it, despite retries. The barcode characters that you enter are hidden using bullet characters.

Freedom EVOware will then try to scan the labware again. If the retry is successful, the scanned barcode will be used. If the retry fails again, the barcode which was entered manually will be used.

If you are using the PosID-3 for general purpose applications in a regulated environment, you must always activate the Double Blind Entry feature if you intend to enter barcodes manually when they cannot be read.

Barcode File panel

For the purpose of testing or training, the PosID-3 driver can be configured to read simulated barcodes from a text file and return them to Freedom EVOware through the PosID-3 - Scan command as if the PosID-3 has actually scanned some labware.

Proceed as follows to use this feature:

- Create a text file with barcodes using the syntax described in A.2.3 “Barcode File for the PosID-3 Driver”, A-13.
- Set the I/O State of the PosID-3 driver to OFF.
- In the configuration of the PosID-3 driver (see above figure), check the *Enable barcode file usage* checkbox and specify the path and name of the barcode file. The suggested file name is PosID3_ManualBarcodes.txt.

Enable barcode file usage

Check this checkbox if you want to use the simulated barcodes feature.

Barcode file

Specify the filename and path of a text file with the simulated barcodes. Specify the filename and path directly or click *Browse* and choose an existing file.

8.5.20 Settings for the REMP PHS

This is used to make settings for the REMP Reatrix 2D Barcode Scanner. For general information on this device see 16.21 “Commands for the REMP PHS”, 16-74.

8.5.20.1 REMP PHS configuration - Driver tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.21 Settings for the REMP Reatrix

This is used to make settings for the REMP Reatrix 2D Barcode Scanner. For general information on this device see 16.22 “Commands for the REMP Reatrix”, 16-74.

8.5.21.1 REMP Reatrix configuration - Driver tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.21.2 REMP Reatrix configuration - Settings tab

The Settings tab is used to make general settings for the REMP Reatrix:

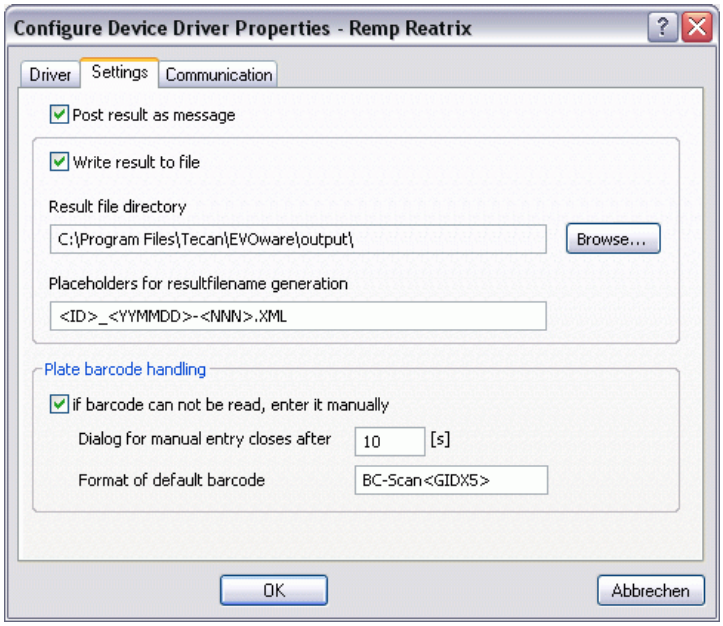


Fig. 8-41 *Settings tab of the REMP Reatrix driver*

The parameters are as follows:

Post result as message

Check this checkbox if you want to send the scanned barcodes to the Freedom EVOware Message Control Server (MCS). See also LogViewer Tool on page A.10 “LogViewer Tool”, A-72. This checkbox must always be checked if you are using Freedom EVOware with the Tecan Sample Tracking software option.

Write result to file

Barcode information which is received from the Reatrix scanner is stored by Freedom EVOware internally. Check this checkbox if you want to write the scanned data to an XML file as well, e.g. for testing or documentation purposes. You must then specify the directory to use for the result file and placeholders for generating the file name. The screen shot above shows recommended values for these parameters.

Plate Barcode Handling panel

If barcode cannot be read, enter it manually

If you check this checkbox, the operator will be prompted to enter the plate barcode manually during process runtime if the scanner was unable to read it. A default barcode will be used if the operator does not enter the barcode within the time specified with *Dialog for manual entry closes after*.

If you do not check this checkbox, a default plate barcode will always be used if the scanner was unable to read it.

Format of default barcode

The following placeholders can be used in this field:

Tab. 8-6 *Placeholders for use in default barcodes*

Placeholder	Example	Description
<IDX> or <GIDX>	123	Counter
<IDX***n***> or <GIDX***n***>	004	Counter which is adjusted to a length of n digits using leading zeros

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text.

Example: Use the following string to generate default barcodes containing the string “Generated” and a 4-digit counter:

Generated<IDX4>

(e.g. Generated0003).

Example: Use the following string to generate default barcodes containing the string “Unreadable” and a counter:

Unreadable<IDX>

(e.g. Unreadable2)

8.5.21.3 REMP Reatrix configuration - Communication tab

The Communication tab is used to make communication settings for the REMP Reatrix:

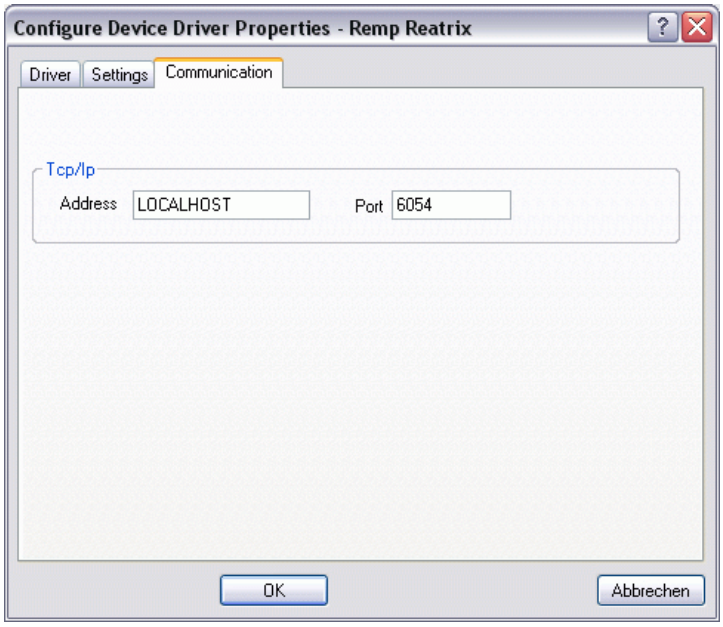


Fig. 8-42 *Communication tab of the REMP Reatrix driver*

The parameters are as follows:

TCP/IP address

Specify the remote TCP/IP address or remote host name if the Reatrix software is running on a different PC to Freedom EVOware. Specify LOCALHOST if the Reatrix software is running on the same PC as Freedom EVOware.

TCP/IP port

Specify the TCP/IP port which is configured in the Reatrix.ini file of the Reatrix software (default port: 6054).

8.5.22 Settings for the REMP ACD96

This is used to make settings for the REMP Reatrix 2D Barcode Scanner. For general information on this device see 16.23 “Commands for the REMP ACD96”, 16-77.

8.5.22.1 REMP ACD96 configuration - Driver tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.22.2 REMP ACD96 configuration - Settings tab

The Settings tab is used to make general settings for the REMP ACD96 Automated Capper Decapper.

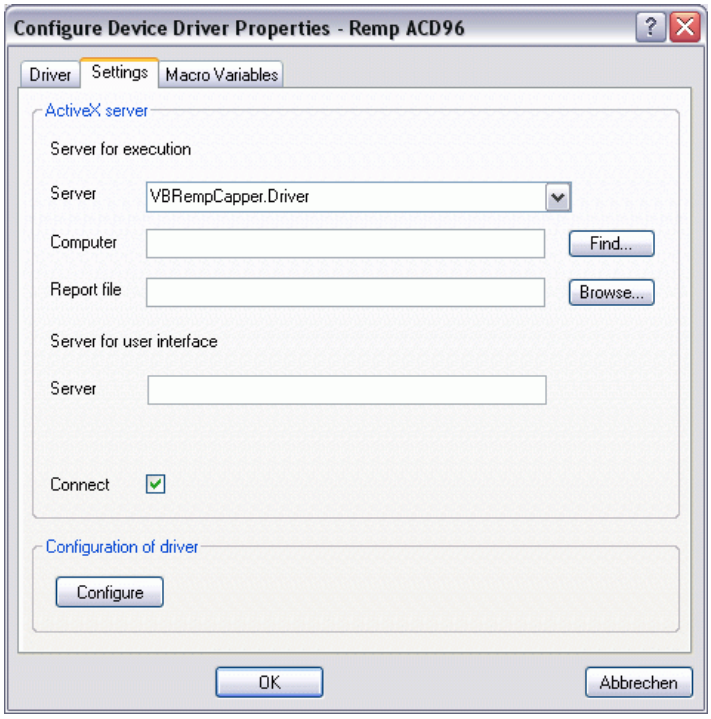


Fig. 8-43 *Settings tab of the REMP ACD96 driver*

The parameters are as follows:

Server

Specify *VBRempCapperDriver*.

Computer

Leave this field blank.

Report file

Specify the path and name of a text file if you want to log the output of the ACD96 driver, e.g. for testing purposes. Create an empty text file, click *Browse* and choose the file you created.

Server

Leave this field blank.

Connect

This checkbox must always be checked.

Configure

This button has no effect because the ACD96 driver does not have any other configurable parameters.

8.5.22.3 REMP ACD96 configuration - Macro Variables tab

There are no user-configurable parameters on this tab.

8.5.23 Settings for the Plate Robot (RoMa)

This is used to make settings for the Plate Robot driver. For general information on this device, see 16.26 “Commands for the Plate Robot”, 16-83.

8.5.23.1 Plate Robot Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.23.2 Plate Robot Configuration - Settings Tab

The Settings tab is used to make general settings for the Plate Robot:

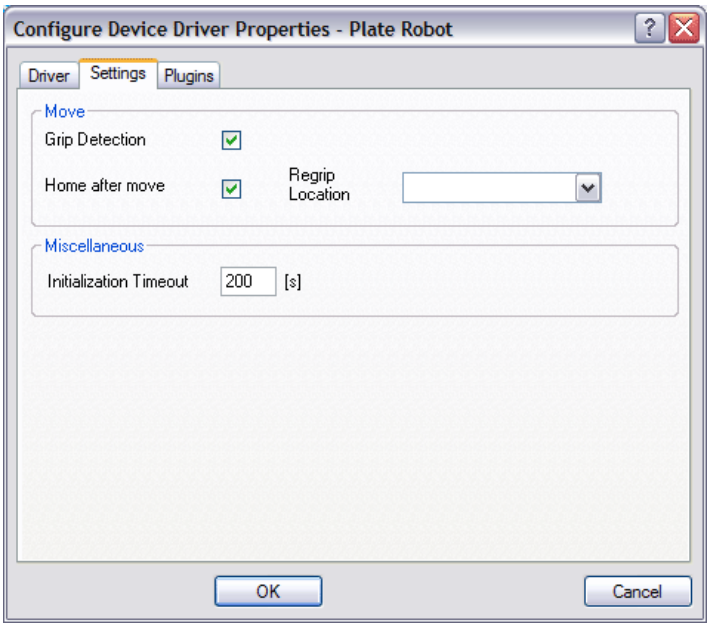


Fig. 8-44 *Settings tab of the Plate Robot driver*

Move panel

Grip Detection

Specify whether grip detection should be used.

Home after move

Specify whether the robot arm should be moved to its home position after each move. This may be necessary for some worktable layouts, but will reduce system performance.

Regrip Location

Choose a location where the plate robot can put down the labware temporarily for the purpose of changing the grip mode from wide to narrow and vice versa and/or for changing the grip position (grip height).

Proceed as follows to specify the regrip location (an unused carrier site):

– Right-click the microplate carrier where you want to regrip and choose Edit Carrier from the context menu.
– Assign a group label (e.g. “Regrip”) to the site you want to use (see 9.5 “Configuring Carriers”, 9-39, “Groups”).
– Save the process.

– Return to this dialog box and choose the carrier site you have labeled from the pull-down list. The group name you have chosen is shown appended to the end of the carrier name, e.g. MP_3Pos_Regrip.

Regrip location is only relevant for Freedom EVOware Plus. The regrip location will be used automatically, e.g. if labware is picked by the RoMa by gripping the narrow side but must be put down on the destination while gripping the wide side. In this case, the labware will be picked up from the source carrier using the Move Narrow RoMa vector, put down on the regrip location, picked up on the wide side using the Move Wide RoMa vector and put down on the destination carrier.

For the regrip location, you must always specify at least two RoMa vector types (Move Narrow and Move Wide). This is usually not necessary for normal carriers. See 9.6.1 “Using RoMa Vectors”, 9-58 for information on RoMa vector types.

The regrip feature is necessary e.g. for some reader and washer types which only allow the RoMa to insert the labware in portrait or landscape orientation for mechanical reasons.

If the Transfer Station driver was installed when you installed Freedom EVOware, regrip location is automatically set to *Transfer* (i.e. use the transfer station for re-gripping). You do not need to create a group label in this case. See 8.5.33 “Settings for the Transfer Station”, 8-113. The Transfer Station driver is only installed if you have installed Freedom EVOware with two RoMas.

This field and the above instructions are only relevant for Freedom EVOware Plus.

Custom grip position

Some special carrier types and device carriers (e.g. readers) may require you to grip the labware at a non-standard grip height or grip position, for example to avoid a collision with adjacent mechanical components. The non-standard grip position is specified with the special carrier attributes *Maximum grip offset* and *Minimum grip offset*. See 9.5.5 “Carrier Attributes”, 9-47, Custom grip position.

In Freedom EVOware Plus, the labware will be regripped automatically using the regrip location if the current grip position is not within the range Minimum grip offset <> Maximum grip offset for the destination carrier.

In Freedom EVOware Standard, you will get a script validation error if the current grip position is not within the range Minimum grip offset <> Maximum grip offset for the destination carrier. In this case, you must use two Transfer Labware commands. The first one moves the labware to an unused carrier and the second one moves the labware from the unused carrier to the destination carrier. This allows the labware to be re-gripped.

Note: *The labware attributes Plate Grip Offset Narrow and Plate Grip Offset Wide adjust the grip position globally for this labware type (not just for a specific carrier).*

Miscellaneous panel

Initialization Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

8.5.23.3 Plate Robot Configuration - Plugins Tab

Plugins are software tools from third-party suppliers which are used to control special devices. The Plugins tab is used to assign the RoMa commands which are needed by the device.

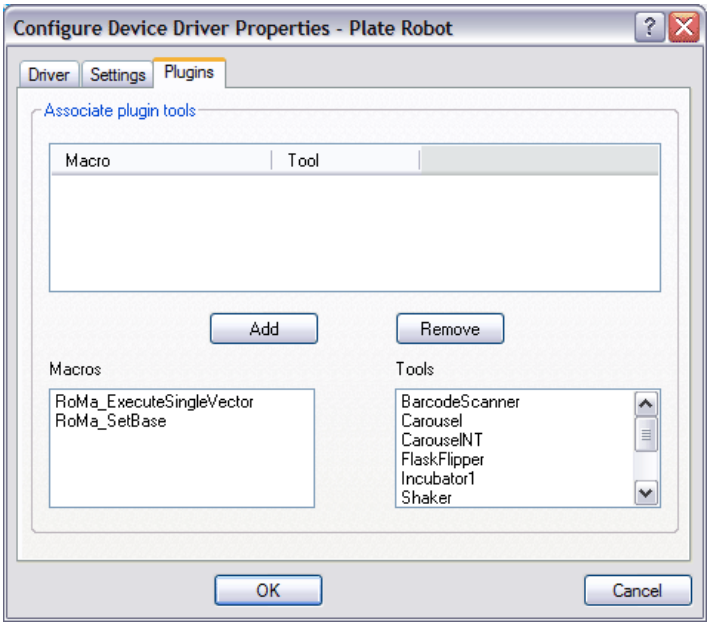


Fig. 8-45 *Plugins tab of the Plate Robot driver*

Associate Plugin Tools panel

Choose the plugin in the Tools panel, choose the RoMa command which the device should use and click Add.

8.5.23.4 Plate Robot Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the RoMa in the Test tab of the Configuration Tool:

Get RSP <GET_RSP>

Requests the pipetting instrument type the device is connected to.

Get VERSION <GET_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

Initialize System <INIT_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.24 Settings for the Te-Shake

This is used to make settings for the Te-Shake. For general information on this device, see 16.28 “Commands for the Te-Shake Shaker”, 16-90.

Freedom EVOware is provided with several different types of Te-Shake shaker. If you want to use more than one shaker in your script or process, you must use the Duplicate Device tool top create a separate device driver for each of them. For more information see 16.28 “Commands for the Te-Shake Shaker”, 16-90.

8.5.24.1 Te-Shake Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.24.2 Te-Shake Configuration - Settings Tab

The Settings tab is used to make general settings for the Te-Shake shaker:

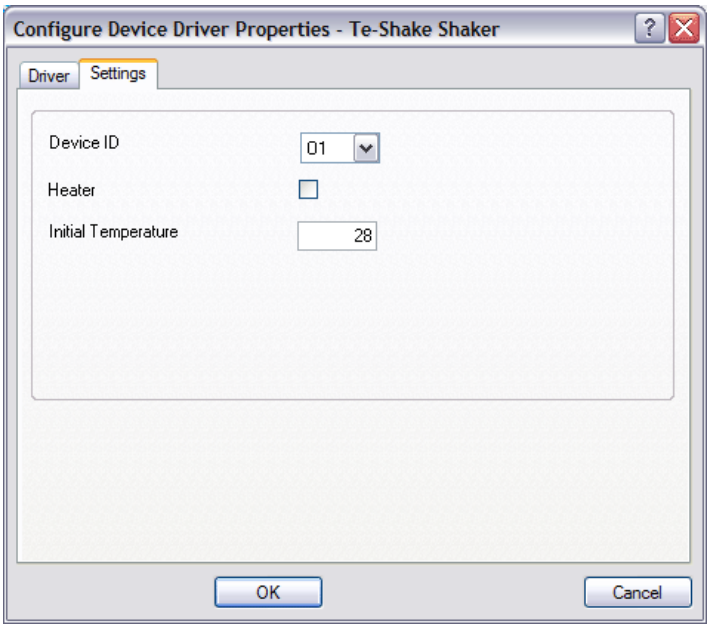


Fig. 8-46 *Settings tab of the Te-Shake driver*

Device ID

Specify the hardware address of the Te-Shake. Specify the address as “address on the switch plus 1”. The address switch of the Te-Shake is on the CC board (inside the device). Each physical device (regardless of device type) must have a unique hardware address.

Heater

Check this checkbox if you want to activate the optional heating plate.

Initial temperature

Specify the required initial temperature of the heating plate (range: 15 to 90 °C). The heating plate cannot cool, so the minimum temperature of the labware is room temperature. The working temperature can be set with the execution parameters when you add the Te-Shake Shake command to your process.

8.5.25 Settings for the Symbol MS-954 Barcode Scanner

This is used to configure settings for the Symbol MS-954 Barcode Scanner. For general information on this device, see 16.2 “Commands for the Symbol LS-1220 Barcode Scanner”, 16-1.

8.5.25.1 Symbol MS-954 Barcode Scanner Configuration - Settings Tab

The Settings tab is used to make general settings for the Barcode Scanner.

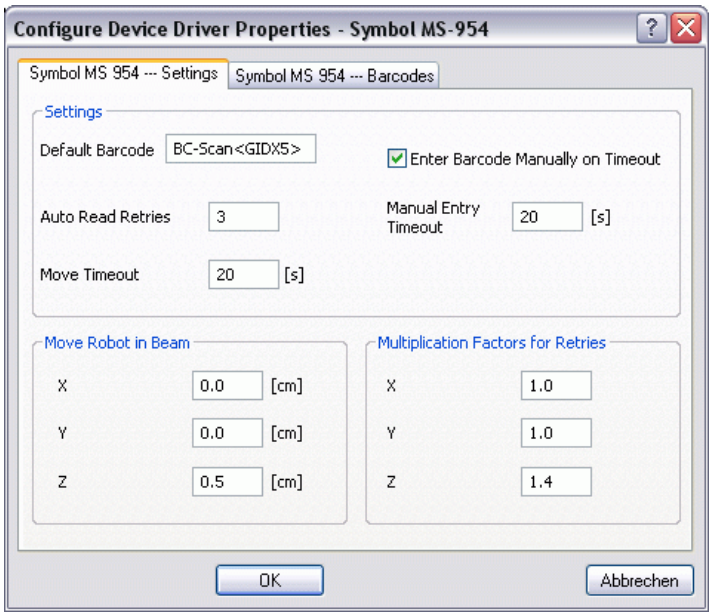


Fig. 8-47 *Settings tab of the Symbol MS-954 Barcode Scanner driver*

Settings panel

Default Barcode

The following placeholders can be used in the *Default Barcode* field:

Tab. 8-7 *Placeholders for use in default barcodes*

Placeholder	Example	Description
<IDX> or <GIDX>	123	Counter
<IDX***n***> or <GIDX***n***>	004	Counter which is adjusted to a length of n digits using leading zeros

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text.

Example: Use the following string to generate default barcodes containing the string “Generated” and a 4-digit counter:

Generated<IDX4>

(e.g. Generated0003).

Example: Use the following string to generate default barcodes containing the string “Unreadable” and a counter:

Unreadable<IDX>
(e.g. Unreadable2)

Enter Barcode Manually on Timeout, Manual Entry Timeout

If you check *Enter Barcode Manually on Timeout*, the operator will be prompted to enter the barcode manually during process runtime if the scanner was unable to read it, despite retries. A default barcode will be used if the operator does not enter the barcode within the specified time (*Manual Entry Timeout* field).

If you do not check *Enter Barcode Manually on Timeout*, a default barcode will always be used if the scanner was unable to read it.

Auto Read Retries

Specify how many times the device should try to read the barcode before considering it unreadable.

Move Timeout

Specify the timeout for the robot move which is associated with the ReadBarcode command. An error message will be output if the robot takes longer than this to move.

Move Robot in Beam

Specify the distances in the x, y and z directions that the robot should move the labware in the scanner beam when scanning.

Multiplication Factors for Retries

Specify multiplication factors for the distances in the *Move Robot in beam* field.

If the labware cannot be scanned on the first try, the distances in Move Robot in Beam are multiplied by the specified multiplication factors for each successive attempt, resulting in larger distances each time. This allows Freedom EVOware to search for the barcode label with the help of the robot in case it is not accurately positioned on the labware.

The barcode scanner can be configured to only accept the barcode types which are expected on your barcode labels. This makes it easier for the scanner to identify incorrect barcodes. This can be done by the Tecan Field Service Engineer using special configuration barcodes. The valid barcode types list is stored in the barcode scanner firmware.

8.5.25.2 Symbol MS-954 Barcode Scanner Configuration - Barcodes Tab

The Barcodes tab is used to configure the barcode types which the Symbol MS-954 barcode scanner will accept:

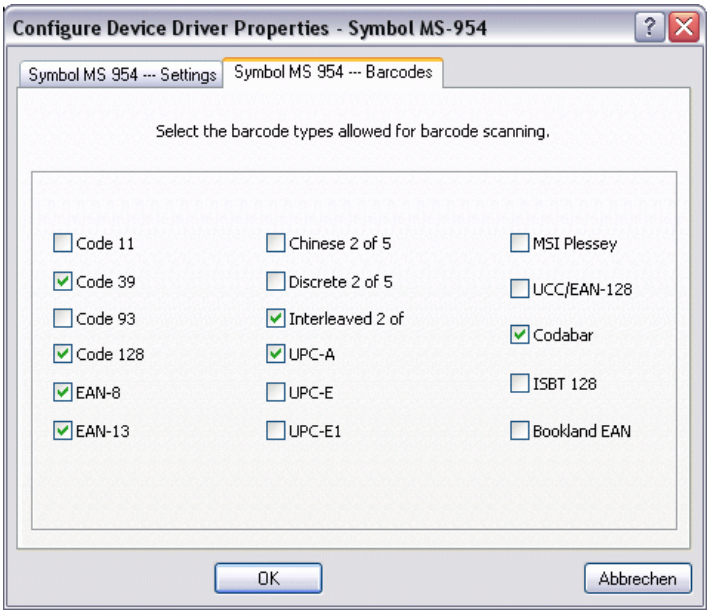


Fig. 8-48 *Barcodes tab of the Symbol MS-954 Barcode Scanner driver*

Barcodes panel

Use the checkboxes to choose how many different barcode types you want to read. You should only configure the barcode types which are expected on your barcode labels. This makes it easier for the scanner to identify incorrect barcodes.

8.5.25.3 Symbol MS-954 Barcode Scanner Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Barcode Scanner in the Test tab of the Configuration Tool:

Read Barcode <STIE>

Performs a single read operation of the barcode scanner.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.26 Settings for the Te-Link

This is used to make settings for the Te-Link. For general information on this device, see 16.41 “Commands for the Te-Link”, 16-127.

8.5.26.1 Te-Link Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.26.2 Te-Link Configuration - Settings Tab

The Settings tab is used to make general settings for the Te-Link:

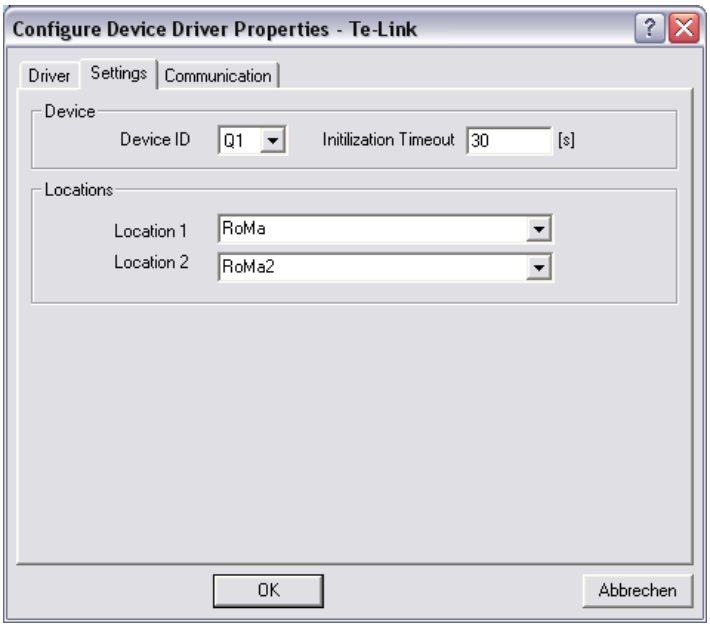


Fig. 8-49 *Settings tab of the Te-Link driver*

Device ID

Specify the hardware address of the Te-Link. Specify the address as “address on the switch plus 1”. The address switch of the Te-Link is on the CC board (inside the device). Each physical device (regardless of device type) must have a unique hardware address.

Initialization timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Locations panel

Location1, Location2

Specify which RoMa should be used to access which position of the Te-Link shuttle.

Location1 and Location2 are assigned to two absolute positions of the Te-Link shuttle (normally the two ends of the Te-Link rail) when setting up the hardware with the *Setup & Service* software. The absolute positions are stored in the device EEPROM. Freedom EVOware uses the stored positions instead of addressing the absolute positions directly.

Proceed as follows to teach two absolute positions for Freedom EVOware with the *Setup & Service* software:

- Move the carrier to the first required position using the Move page of the Te-Link panel and note the current position in instrument steps.
- Send the following firmware command to the Te-Link to store the first position: <DeviceID>SCP0,<position>
  - where <DeviceID> is the the hardware address of the Te-Link and <position> is the absolute position of the carrier in instrument steps, for example: Q1SCP0,374.
- Move the carrier to the second required position and note the new position.
- Send the following firmware command to the Te-Link to store the second position: <DeviceID>SCP1,<position>

The Setup & Service software is described in the Instrument Software Manual (Doc ID 392888). Please refer to the Instrument Software Manual for additional information.

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.26.3 Te-Link Configuration - Communications Tab

The Communications tab is used to make communications settings for the device driver:

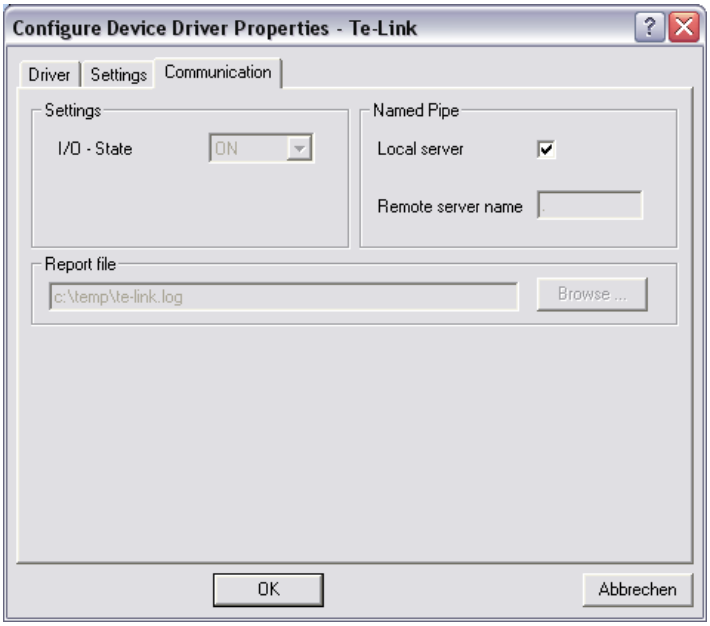


Fig. 8-50 *Communications tab of the Te-Link driver*

Local server

Check this checkbox if the Te-Link is attached to the local Freedom EVOware installation.

Remote server name

Specify the remote TCP/IP address or remote host name if the Te-Link is connected to another Freedom EVOware installation running on a different PC. The local Freedom EVOware installation will then control the Te-Link device through the network connection.

8.5.27 Settings for the Te-MagS

This is used to make settings for the Te-MagS (Magnetic Bead Separator). For general information on this device, see 16.32 “Commands for the Magnetic Bead Separator”, 16-100.

8.5.27.1 Te-MagS Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.27.2 Te-MagS Configuration - Settings Tab

The Settings tab is used to make general settings for the Te-MagS:

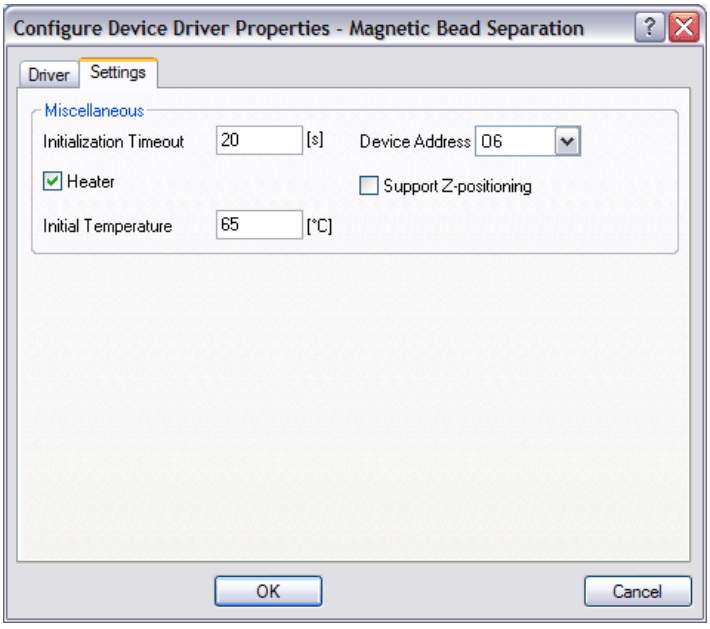


Fig. 8-51 *Settings tab of the Te-MagS driver*

Miscellaneous panel

Initialization Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Device Address

Specify the hardware address of the Te-MagS. Specify the address as “address on the switch plus 1”. The address switch of the Te-MagS is on the CC board (inside the device). Each physical device (regardless of device type) must have a unique hardware address.

Support Z-Positioning

If you check this checkbox, you can adjust the height (Z position) of the magnet block in the MoveToPosition and Execute commands to simplify aspiration of the supernatant or wash liquid if there is only a small volume of liquid in the labware. This checkbox should only be checked if your Te-MagS hardware supports this feature.

Heater

Check this checkbox if you want to activate the optional heating function.

Initial Temperature

Specify the required initial temperature of the heating block (range: 15 to 80 °C). The heating block cannot cool, so the minimum temperature of the labware is room temperature. The working temperature can be set with the execution parameters when you add the Te-MagS ActivateHeater command to your process.

8.5.27.3 Te-MagS Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Te-MagS in the Test tab of the Configuration Tool:

Get RSP <GET_RSP>

Requests the pipetting instrument type the device is connected to.

Get VERSION <GET_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

Initialize System <INIT_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.28 Settings for the Te-Stack and Te-Stack Te-MO

This is used to make settings for the Te-Stack and the Te-Stack Te-MO. For general information on these devices, see 16.34 “Commands for the Te-Stack”, 16-107.

8.5.28.1 Te-Stack and Te-Stack Te-MO Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.28.2 Te-Stack and Te-Stack Te-MO Configuration - Settings Tab

The following dialog box is used to make general settings:

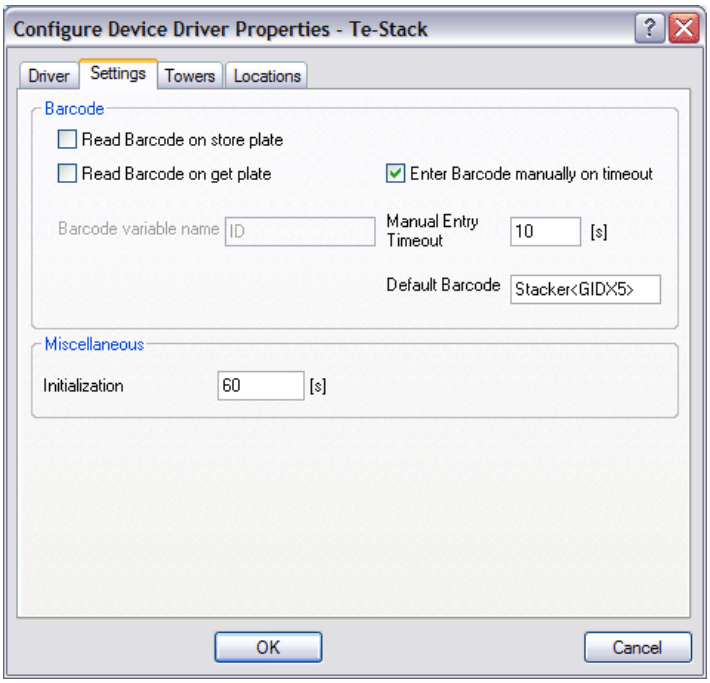


Fig. 8-52 *Settings tab of the Te-Stack driver*

Barcode panel

Specify the barcode scanner settings for the Te-Stack.

Note: *The Te-Stack Te-MO cannot be fitted with a barcode scanner and you cannot make any entries in the Barcode panel in this case.*

Read barcode on store plate

Read the labware barcode when returning labware to the stacker.

Read barcode on get plate

Read the labware barcode when getting labware from the stacker.

Barcode variable name

Specify the name of an internal variable which should be used to store the barcode which is scanned. The default variable name for barcodes is “ID”.

Enter Barcode Manually on Timeout, Manual Entry Timeout

If you check *Enter Barcode Manually on Timeout*, the operator will be prompted to enter the barcode manually during process runtime if the scanner was unable to read it. A default barcode will be used if the operator does not enter the barcode within the specified time (*Manual Entry Timeout* field).

If you do not check *Enter Barcode Manually on Timeout*, a default barcode will always be used if the scanner was unable to read it.

Default Barcode

The following placeholders can be used in the *Default Barcode* field:

Tab. 8-8 Placeholders for use in default barcodes

Placeholder	Example	Description
<IDX> or <GIDX>	123	Counter
<IDX*n*> or <GIDX*n*>	004	Counter which is adjusted to a length of n digits using leading zeros

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text.

Example: Use the following string to generate default barcodes containing the string “Generated” and a 4-digit counter:

Generated<IDX4>

(e.g. Generated0003).

Example: Use the following string to generate default barcodes containing the string “Unreadable” and a counter:

Unreadable<IDX>

(e.g. Unreadable2)

Miscellaneous panel

Initialization Timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

8.5.28.3 Te-Stack and Te-Stack Te-MO Configuration - Towers Tab

The standard Te-Stack normally has two towers, each of which can hold up to 50 microplates (depending on microplate height). When you fetch labware, the Te-Stack brings it from the specified tower to the Te-Stack transfer position, where it can be picked up by the RoMa. To return the labware, the RoMa puts it on the Te-Stack transfer position and the Te-Stack moves it back into the specified tower. Both towers share the same transfer position. A moveable carriage (the “shuttle” or “transfer carrier”) is used to move the labware between the transfer position and the two towers.

The Te-Stack Te-MO does not have or need a shuttle. It is able to put plates directly onto the Te-MO slides.

To increase the total storage capacity, Freedom EVOware can group several physical Te-Stack devices into one logical Te-Stack device. Each pair of towers has its own shuttle and each shuttle has its own transfer position.

The number of transfer positions (RoMa sites) in the logical Te-Stack device, the total number of towers and the number of plates per tower are configured with *Position Layout* and *Use to offset RoMa vector* in the Carrier Definition (see 9.5 “Configuring Carriers”, 🗎 9-39).

This dialog box is used to assign the towers to the physical Te-Stack devices:

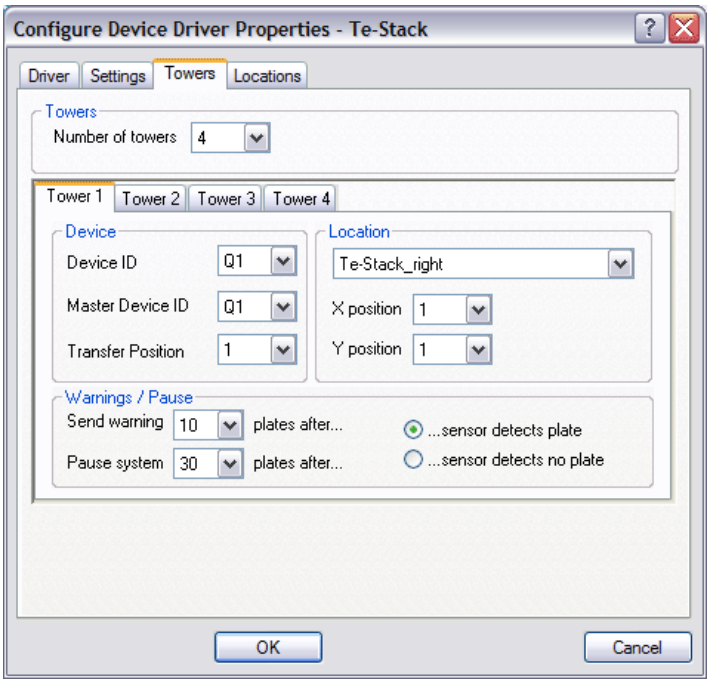


Fig. 8-53 *Towers tab of the Te-Stack driver*

Towers panel

Number of Towers

Specify the number of towers in the logical Te-Stack device. Depending on your setting, additional tabs will appear (Tower 1, Tower 2, etc.) where you can configure each of the towers.

The following parameters must be set for each tower:

Device panel

Device ID

Each tower has a unique device ID (hardware address). Specify the ID for this tower. On the Te-Stack, the device ID is set with the address switch on the printed circuit board (inside the device). Each physical device (regardless of device type) must have a unique hardware address.

Master Device ID

Each shuttle can serve two towers. The master tower is the tower which controls the shuttle and the optional barcode scanner. Specify the device ID (hardware address) of the master tower.

Note: *If the Te-Stack is mounted above the Te-MO ("Te-MO Stacker"), the Master ID must be set here to <TeMo>.*

Transfer Position

The position of the shuttle (sliding carrier) when it is below the selected tower. The Te-Stack tower can pick up and put down labware on the slide at this position.

With the default tower configuration for a double Te-Stack:
Tower 1: Shuttle position 1
Tower 2: Shuttle position 1
Tower 3: Shuttle position 2
Tower 4: Shuttle position 2
See Fig. 8-54, 8-100, below.

Note:
RoMa transfer position: Shuttle position 0
Waste position (hardware option): Shuttle Position 3

Location panel

Location

Specify the Freedom EVOware location associated with this device. Te-Stack_left is on the left of the worktable. Te-Stack_right is on the right of the worktable. Te-Stack Te-MO is the Te-MO Stacker option.

X Position

Specify the site index along the X axis for the location for this tower:

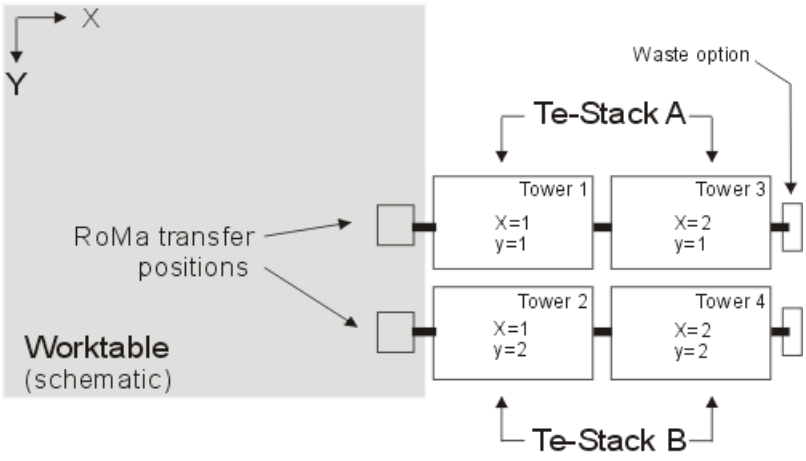


Fig. 8-54 *Site index, Double Te-Stack Right (with the default tower configuration)*

Y Position

Specify the site index along the Y axis for the location for this tower.

Warnings/Pause panel

You can configure the Te-Stack driver to issue a warning or to pause the system according to a signal from its labware sensor. The labware sensor is mounted about half way up one of the stacker towers. The number of labware items in the tower when it is half full depends on the height of each item.

Click *Sensor detects no plate* if you want the Te-Stack driver to issue a nearly empty warning or to pause the system when the Te-Stack is being unloaded. Set *Pause system x plates after* to 45% - 50% of the number of plates which fit in the

tower. Set *Send warning x plates after* to a slightly higher number of plates. This ensures that the warning will be issued before the system pauses.

Click *Sensor detects plate* if you want the Te-Stack driver to issue a nearly full warning or to pause the system when the Te-Stack is being loaded with plates. Set *Pause system x plates after* to 45% - 50% of the number of plates which fit in the tower. Set *Send warning x plates after* to a slightly lower number of plates. This ensures that the warning will be issued before the system pauses.

The above suggestions for how many plates to set for the warning and/or system pause are guidelines only. Test your stacker system with the plates you plan to use to get more accurate figures. Specify a large number of plates if you want to disable the warning and/or the system pause.

8.5.28.4 Te-Stack and Te-Stack Te-MO Configuration - Locations Tab

Te-Stack

The Te-Stack is able to move labware to the Te-Stack transfer position without using the RoMa. Labware on the Te-Stack transfer position can be accessed by the LiHa for pipetting.

If you want to pipette with the LiHa onto the Te-Stack transfer position(s), they must be associated with locations in Freedom EVOware. This is done using this tab:

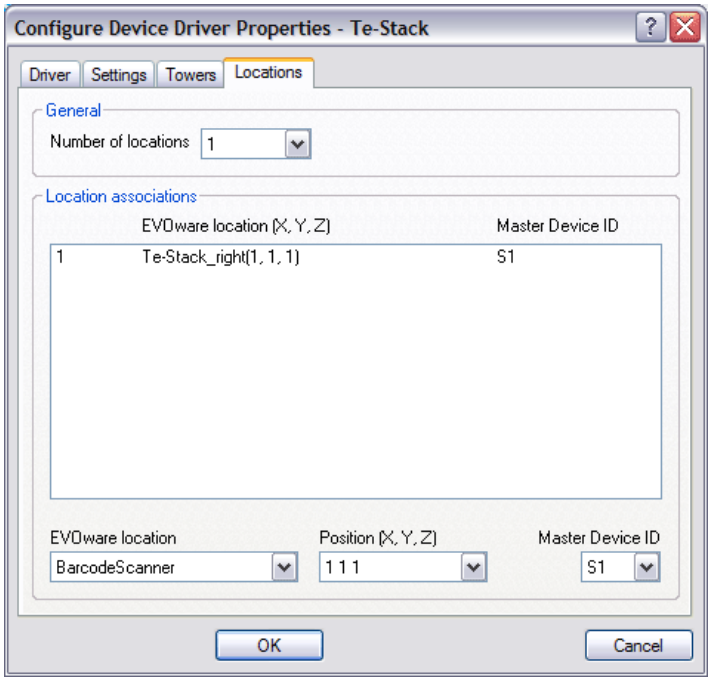


Fig. 8-55 *Locations tab of the Te-Stack driver*

Te-Stack Te-MO

The Te-Stack Te-MO is able to move labware to a site on one of the Te-MO slides without using the RoMa. Labware on the Te-MO carrier can be accessed by the Te-MO pipetting head by moving the slides to position the site below the pipetting head.

The middle slide of the Te-MO is normally only used for DITI racks, troughs, wash stations and tip blocks. You can only put microplates on the outer two slides. Specify six locations for the Te-Stack Te-MO if you are using DITIs:

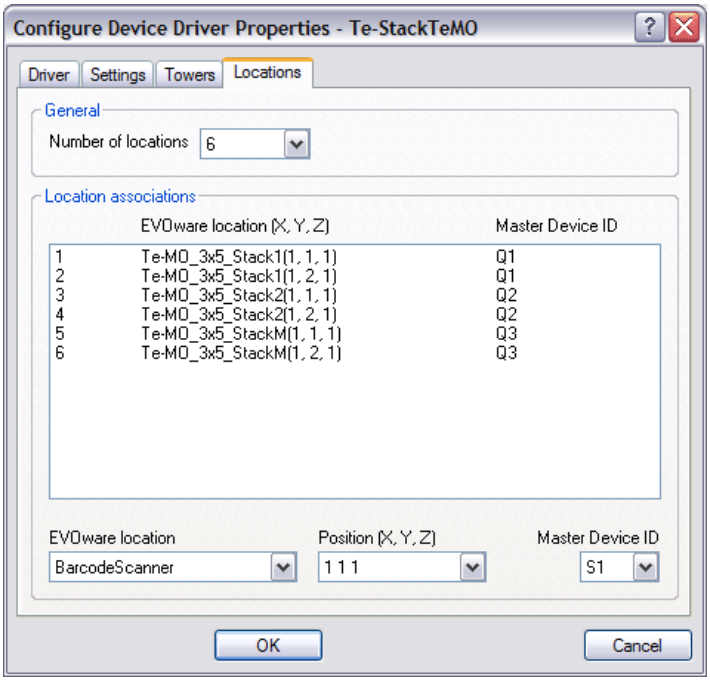


Fig. 8-56 *Locations tab of the Te-Stack Te-MO driver*

If you are not using DiTis you only need to specify four locations for the Te-Stack Te-MO. See also *EVOware location*, below.

General panel

Number of Locations

Choose the required number of Freedom EVOware locations (i.e. Te-Stack transfer positions) for this logical Te-Stack device. For example, a Te-Stack with two towers and one transfer position has one location.

You only need to specify locations if you want to pipette onto labware which is on the transfer position. In most cases, you should set the number of locations to the number of transfer positions which are available. You will then be able to pipette to all of the transfer positions on the Te-Stack.

Locations Associations panel

To change the assignment of an Freedom EVOware location to a transfer position, select it in the list and adjust the settings using the pull-down lists:

Freedom EVOware location

Choose the Freedom EVOware location as follows:

Te-Stack

For the Te-Stack, choose Te-Stack_left or Te-Stack_right. Te-Stack_left is on the left of the worktable. Te-Stack_right is on the right of the worktable.

Te-Stack Te-MO

The three towers of the Te-Stack Te-MO can only put labware on the front two sites of the respective Te-MO slide (a total of six locations). For mechanical reasons, the sites at the rear of the Te-MO are not accessible to the stacker. Use the Groups column in the carrier definition for the Te-MO to group equivalent sites into a single Freedom EVOware location. For example,

assign Te-MO sites 4 and 5 to “Stack1”, sites 9 and 10 to “StackM” and sites 14 and 15 to “Stack2”. The location groups are then shown in the Freedom EVOware location pull-down list. See “Groups” in 9.5 “Configuring Carriers”, 9-39.

Te-MO sites are counted from rear to front and then from left to right:

Tab. 8-9 *Te-MO 3x5 site numbers*

Te-MO 3 x 5		
1	6	11
2	7	12
3	8	13
4	9	14
5	10	15

Tab. 8-10 *Te-MO 3x3 site numbers*

Te-MO 3 x 3		
1	4	7
2	5	8
3	6	9

Use the following group labels in the Te-MO 3 x 5 carrier definition if you want to use the Te-Stack Te-MO to put labware on both outer slides and DITI racks on the middle slide:

Tab. 8-11 *Te-MO 3x5 group labels*

Te-MO 3 x 5		
Slide1	SlideM	Slide2
Slide1	SlideM	Slide2
Slide1	SlideM	Slide2
Stack1	StackM	Stack2
Stack1	StackM	Stack2

Then configure the locations as shown in Fig. 8-56, 8-103. For mechanical reasons, the Te-Stack Te-MO cannot be fitted to the Te-MO 3 x 3. You can use different group names if you want to, but you should use the same scheme.

Position

Choose the position coordinates. For the above example of the Te-Stack Te-MO, the front two sites on each slide only differ in the Y coordinate. For slide 1, create two locations Te-MO_3x5_Stack1 and assign them to 1,1,1 and 1,2,1 respectively. Follow the same system for both other slides.

Note: *The Freedom EVOware locations and location groups for the Te-MO are only visible in the pull-down list if you have put a Te-MO on the worktable.*

Master Device ID

Choose the device ID (hardware address) of the master tower for the current location. The master tower is the tower which controls the shuttle and the optional barcode scanner. On the Te-Stack tower, the device ID is set with the address switch on the printed circuit board (inside the device).

Note: *Make sure that you have correctly set the Allowed Robots field for all locations which are involved. To do this, click Attributes in the Edit Carrier dialog box for the Te-Stack.*

8.5.28.5 Te-Stack and Te-Stack Te-MO Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Te-Stack and the Te-Stack Te-MO in the Test tab of the Configuration Tool:

Get RSP <GET_RSP>

Requests the pipetting instrument type the device is connected to.

Get VERSION <GET_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

Initialize System <INIT_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.29 Settings for the Te-VacS

This is used to make settings for the Te-VacS (vacuum separator option). For general information on this device, see 16.35 “Commands for the Te-VacS”, 16-110.

The Te-VacS carrier has six sites: filtration plate (front and rear), vacuum block (front and rear) and collection plate (front and rear). The vacuum block supports the filtration plate. The collection plate is inside the vacuum block and is underneath the filtration plate. It is supported by a so-called adaptor plate. Seven different adaptor plates with different heights are available from Tecan. When setting up the Te-VacS, you must adjust the Te-VacS carrier configuration for the height of the adaptor plate you are using, which affects the height of the collection

plate. The parameter to change is *Z-offset for* the collection positions, carrier sites 3 and 6 (see 9.5 “Configuring Carriers”, 9-39).

8.5.29.1 Te-VacS Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.29.2 Te-VacS Configuration - Settings Tab

The Settings tab is used to make general settings for the Te-VacS.

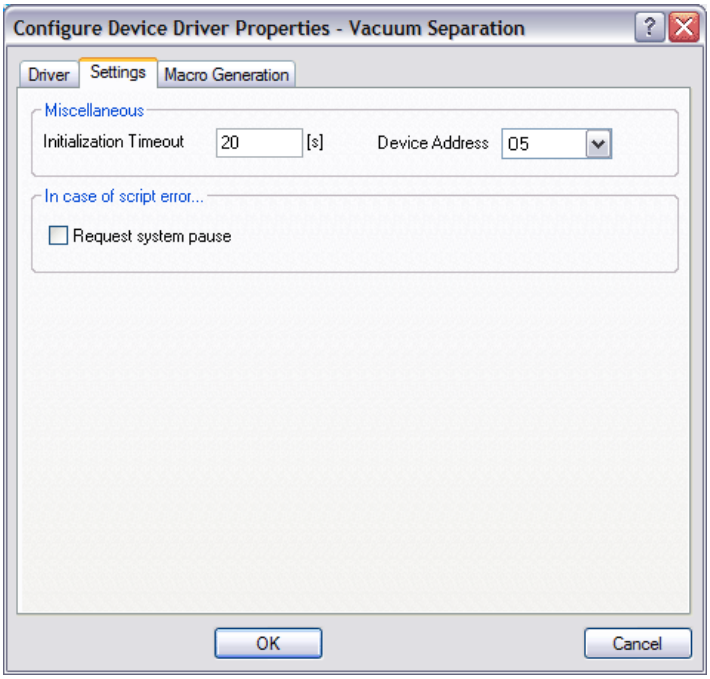


Fig. 8-57 *Settings tab of the Te-VacS driver*

Miscellaneous panel

Initialization timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Device address

Specify the hardware address of the Te-VacS. Specify the address as “address on the switch plus 1”. The address switch of the Te-VacS is on the CC board (inside the device). Each physical device (regardless of device type) must have a unique hardware address.

In case of script error panel

Request system pause

Check this checkbox if you want the driver to request a system pause if a script error is detected during command execution.

Note: *Do not confuse the settings made here with those made in the scheduling/ error handling configuration. The settings in this tab define the reaction of the system if the vacuum separator outputs an error message during execution of a Te-VacS command. The settings for error handling take effect if the Te-VacS command has already been stopped due to an error.*

8.5.29.3 Te-VacS Configuration - Command Generation Tab

The Command Generation tab is used to make settings for the default pre-actions and post-actions to be used when generating commands for the Te-VacS. The settings are only relevant to Freedom EVOware Plus.

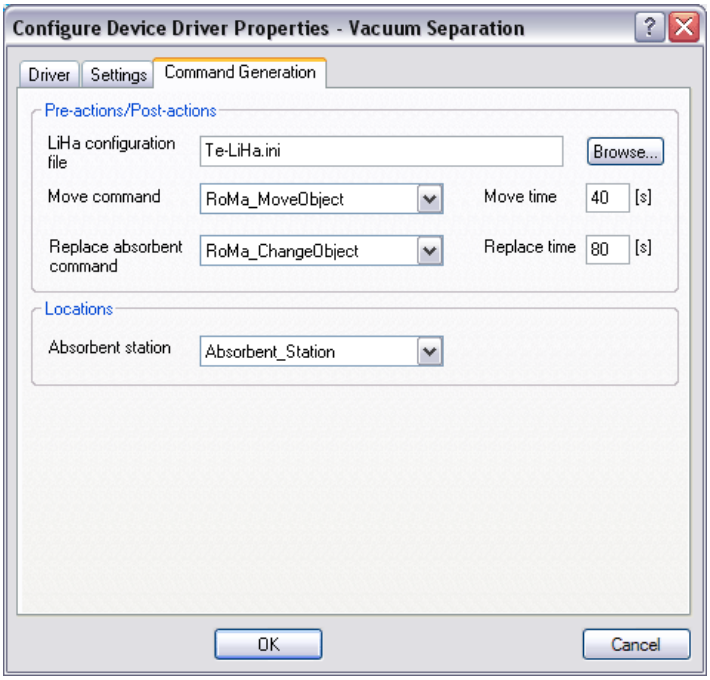


Fig. 8-58 *Command Generation tab of the Te-VacS driver*

Pre-actions / Post actions panel

LiHa configuration file

Specify the file which contains the LiHa configuration. Specify the path and file name of the file directly or click Browse and choose an existing file. It is normally located in the Freedom EVOware <install_path> directory.

Move command

Choose the command to use for moving the plates and specify the execution time to be used when scheduling this command.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. For each object which needs to be moved, it then uses the specified move command to create and configure the RoMa movements which will be needed.*

Replace absorbent command

Choose the command to use for replacing the absorbent station and specify the execution time to be used when scheduling this command. The absorbent station uses a blotting pad to remove drops of liquid from the bottom of the filtration and collection plates (the labware is put on to the pad using the RoMa). The replacement intervals for the absorbent station are configured in the Filtration command and depend on your application or experiment.

Note: *Freedom EVOware compares the initial worktable layout with the worktable layout which is required by the script. It then uses the specified replace action to create and configure the RoMa movements which will be needed when the absorbent station needs to be replaced because the blotting pad is used up.*

Locations panel

This panel is used to specify the location (carrier site) of the absorbent station.

Absorbent station

The absorbent station uses a blotting pad to remove drops of liquid from the bottom of the filtration and/or collection plate after each filtration step. It usually consists of a stand or carrier that contains a piece of fabric or absorbent material. It can also be programmed to be a replaceable item. The filtration or collection plate is put on to the absorbent station using the RoMa.

Proceed as follows to configure the absorbent station:

– Create a suitable one-site carrier for the absorbent station and put it on the worktable. Use the name Absorbent_Station.
– Create labware for the absorbent station. Use the name AbsorbentPlate.
– Create a suitable RoMa vector for the labware.
– Put the labware on the carrier:
  • If the absorbent station labware is fixed and not replaceable, you must create it on the carrier using the labware generator. Select the labware in the Control Bar, press Ctrl and drag the labware onto the carrier in the Worktable Editor. This opens the the labware generator. In the labware generator, assign the name AbsorbentPlate in the Labware Groupname field. After closing the labware generator, this name will be shown in the yellow label of the generated labware.
  • If the absorbent station labware will be replaced after each use, the labware must be stored in a hotel or other storage device and be brought to the worktable using the RoMa with each iteration of the filtration commmand. Create sufficient absorbent plate labware items in the hotel using the labware generator.
– Return to the Command Generation dialog box and choose the location Absorbent_Station in the pull-down list.
– Choose the appropriate options for the absorbent station in the General tab of the Te-VacS - Filtration command.

The Command Generation dialog box and the above instructions are only relevant for Freedom EVOware Plus.

8.5.30 Settings for the Te-MO

This is used to make settings for the Te-MO. For general information on this device, see 15.56 “Te-MO Commands”, 15-121.

8.5.30.1 Te-MO Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.30.2 Te-MO Configuration - Settings Tab

The Settings tab is used to make general settings for the Te-MO:

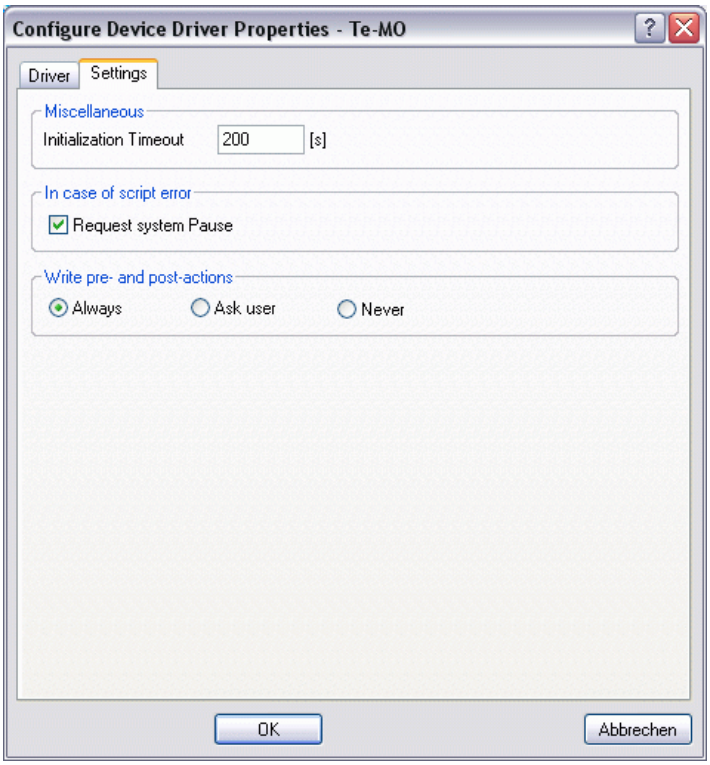


Fig. 8-59 *Settings tab of the Te-MO driver*

Miscellaneous panel

Initialization timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

In case of script error panel

Request system pause

Check this checkbox if you want the driver to request a system pause if a script error is detected during command execution.

Write pre and post actions panel

This setting is only relevant for Freedom EVOware Plus. Pipette process steps for the LiHa, MCA96 and MCA384 allow you to configure custom pre-actions and post-actions in the Process Editor. They apply to the currently selected process step. This is not possible for the Te-MO. As an alternative, you can edit the standard (global) pre-actions and post-actions for the Te-MO in the Configuration Tool. However, the changes you make are normally overwritten by the default settings each time the Te-MO pipetting script (the Te-MO Pipette process step) is modified. Click the radio buttons to change the behaviour, as follows:

Always

Changes to the standard pre-actions and post-actions are always overwritten when the the Te-MO Pipette process step is modified (default action).

Ask user

Prompt the user before overwriting changes to standard pre-actions and post-actions.

Never

Never overwrite changes to standard pre-actions and post-actions.

8.5.30.3 Te-MO Configuration - Firmware Commands

The following firmware commands (command strings) are pre-configured for the Te-MO in the Test tab of the Configuration Tool:

Get RSP <GET_RSP>

Requests the pipetting instrument type the device is connected to.

Get VERSION <GET_VERSION>

Requests the firmware version of the pipetting instrument. Only the first two positions are shown.

Initialize System <INIT_RSP>

Initializes the pipetting instrument.

Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 🗎 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

8.5.31 Settings for the Pooling Balance

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. The LAC feature is only supported by special balance types such as the Mettler WM pooling balance. See 10.1.1 “Global Parameters for Liquid Classes”, 🗎 10-4, Liquid Arrival Check panel, for more information.

Maximum initial weight

Specify the maximum allowed weight of the objects on the pooling balance before the script or process is started. If the specified maximum is exceeded, an error will be output when the balance is initialized. In addition, you cannot run the script or process until the weight on the balance has been reduced.

To ensure maximum accuracy of the balance, it must not be overloaded. Make sure that the sum of maximum initial weight + weight of the liquids you want to dispense does not exceed the rated maximum weight for the balance.

8.5.32 Settings for the Process Script

This is used to make settings for the Process Script driver. For general information on this device, see 16.39 “Commands for the Process Script Driver”, 16-126.

8.5.32.1 Process Script Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.32.2 Process Script Configuration - Settings Tab

The Settings tab is used to make general settings for the Process Script driver.

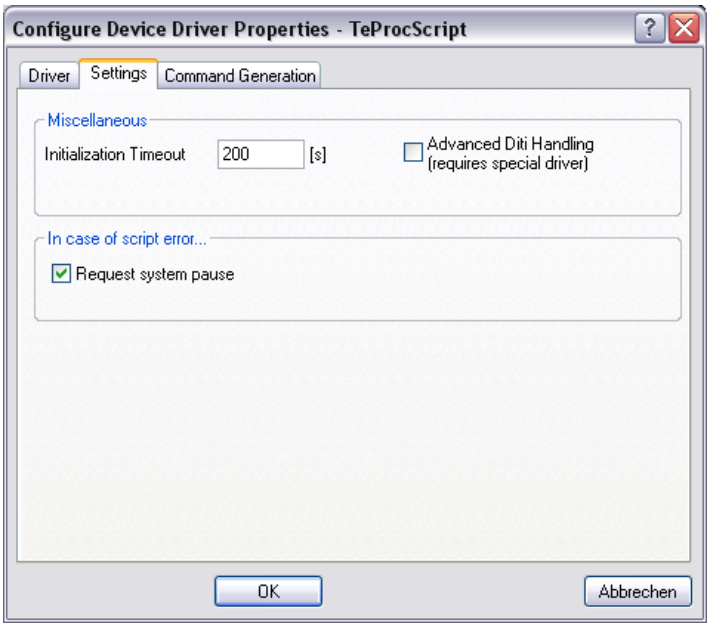


Fig. 8-60 *Settings tab of the Process Script driver*

Miscellaneous panel

Initialization timeout

Specify the maximum duration of the device initialization procedure. An error message will be output if initialization is not completed within this time.

Advanced DITI handling

Check this checkbox if you want to use to use a special driver for exchanging DITIs. The special driver is not provided with the standard Freedom EVOware installation.

In case of script error panel

Request system pause

Check this checkbox if you want the driver to request a system pause if a script error is detected during command execution.

Note: *Do not confuse the settings made here with those made in the scheduling/ error handling configuration. The settings in this tab define the reaction of the system if the Process Script driver outputs an error message during execution of a pipetting command. The settings for error handling take effect if the pipetting command has already been stopped due to an error.*

8.5.32.3 Process Script Configuration - Command Generation Tab

The Command Generation tab is used to make settings for the default pre-actions and post-actions to be used when generating commands for the Process Script. The settings are only relevant to Freedom EVOware Plus.

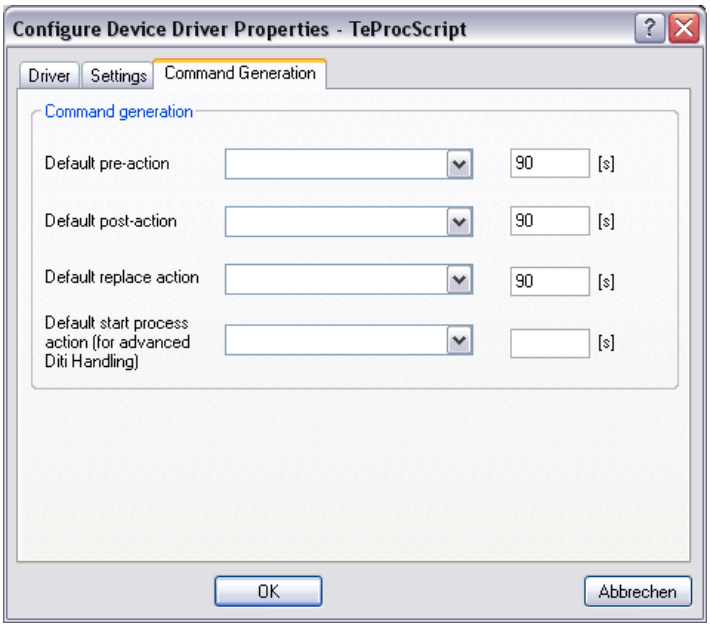


Fig. 8-61 *Command Generation tab of the Process Script driver*

Command Generation panel

Default pre-action

This field is not relevant for the Process Script and can be ignored.

Default post-action

This field is not relevant for the Process Script and can be ignored.

Default replace action

This field is not relevant for the Process Script and can be ignored.

Default start process action for advanced DITI handling

This field is not relevant for the Process Script and can be ignored.

8.5.33 Settings for the Transfer Station

The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, it is used to transfer labware from one RoMa to another. The Transfer Station driver is only installed if you have installed Freedom EVOware with two RoMas.

8.5.33.1 Transfer Station Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.33.2 Transfer Station Configuration - Settings Tab

The Settings tab is used to make general settings for the Transfer Station driver:

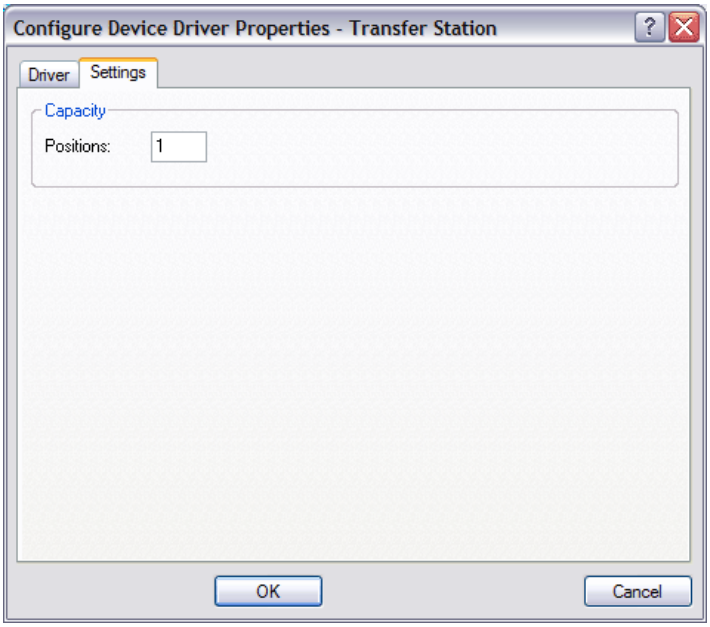


Fig. 8-62 *Settings tab of the Transfer Station driver*

Capacity panel

Positions

This specifies the number of Transfer Station sites. This field should normally be left at the default value of 1 (one site).

8.5.34 Settings for Microplate Reader Devices

The GENios, GENios Pro, Safire, Spectra, SpectraFluor, Sunrise, Ultra and Ultra Evolution microplate reader devices are controlled by the same driver and have a

common configuration dialog. For general information on these devices, see the respective section in 16 “Device Commands”, 16-1.

8.5.34.1 Microplate Reader Configuration - Driver Tab

See 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116.

8.5.34.2 Microplate Reader Configuration - Settings Tab

The Settings tab is used to make general settings for the microplate reader driver:

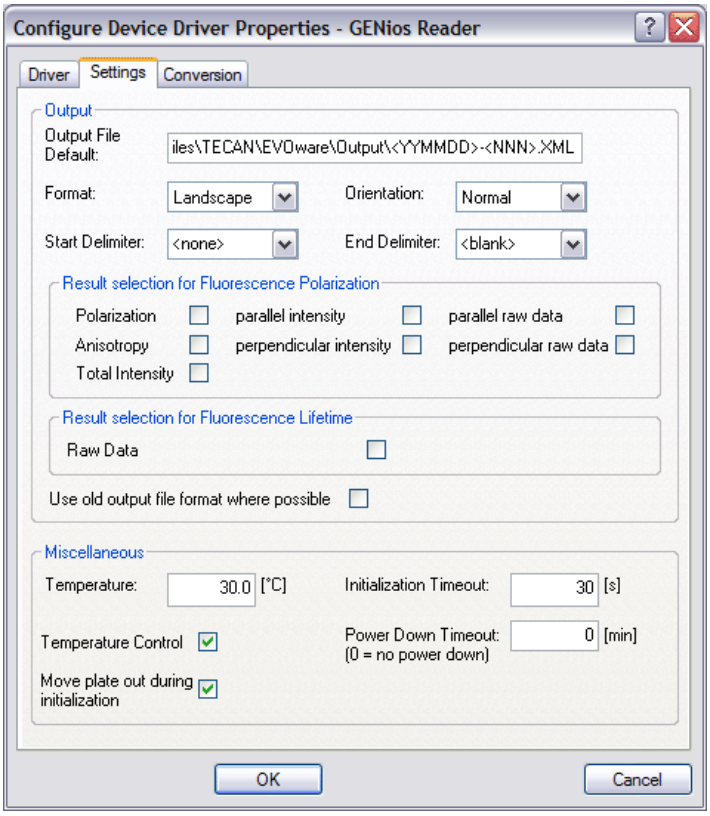


Fig. 8-63 *Settings tab of the microplate reader driver*

Output panel

Output File Default

Specify the default file name and path to be used for the output data. If necessary, you can overwrite the file name and path when you add the measurement command to your process. See 16.42 “Specifying Output Filenames for Reader Data”, 16-128 for a description of the placeholders which can be used to generate reader data file names.

Format

This setting is used to swap rows and columns in the records of the output file. E.g. for a 96-well microplate, the data is output as 8 rows x 12 columns or 12 rows x 8 columns.

Orientation

This setting is used to reverse the row order in the records of the output file. E.g. for a 96-well microplate, the first 12 records contain data for row 1 or for row 8. This can be useful if you want to insert the labware in the reader back to front.

Start Delimiter

Choose the delimiter to use at the beginning of each data record in the output file. You can choose none or blank (space character).

End Delimiter

Choose the delimiter to use at the end of each data record in the output file. You can choose none or blank (space character).

Result Selection for Fluorescence Polarization panel

Select the types of results you want to be written to the output file when carrying out fluorescence polarization. Each checkbox is only relevant for readers which support the respective measurement mode. The checkbox will be ignored if the reader does not support the respective mode.

Result Selection for Fluorescence Lifetime panel

Specify whether you want raw data to be written to the output file or not.

Use old output file format where possible

Check this box if you want the reader to write its output in the file format used before version 4.8.1 of FACTS and not in the XML format used by later versions of FACTS and by Freedom EVOware.

Miscellaneous panel

Temperature, Temperature Control

Check the *Temperature Control* checkbox if you want to carry out reader measurements at a specified temperature. The required temperature is specified in the *Temperature* field. Refer to your reader manual for the allowed temperature range.

Move plate out during initialization

Check this checkbox if you want to move out the labware during the initialization procedure.

Initialization Timeout

Specify the maximum duration of the reader initialization procedure. An error message will be output if initialization is not completed within this time.

Power Down Timeout

Specify the delay after which the reader should go into standby (energy saving) mode. Specify 0 if you do not want the reader to go into standby mode. The reader can take several minutes to wake up from standby mode before it is ready for use.

8.5.34.3 Microplate Reader Configuration - Conversion Tab

The Conversion tab is used to make settings for measurement result handling.

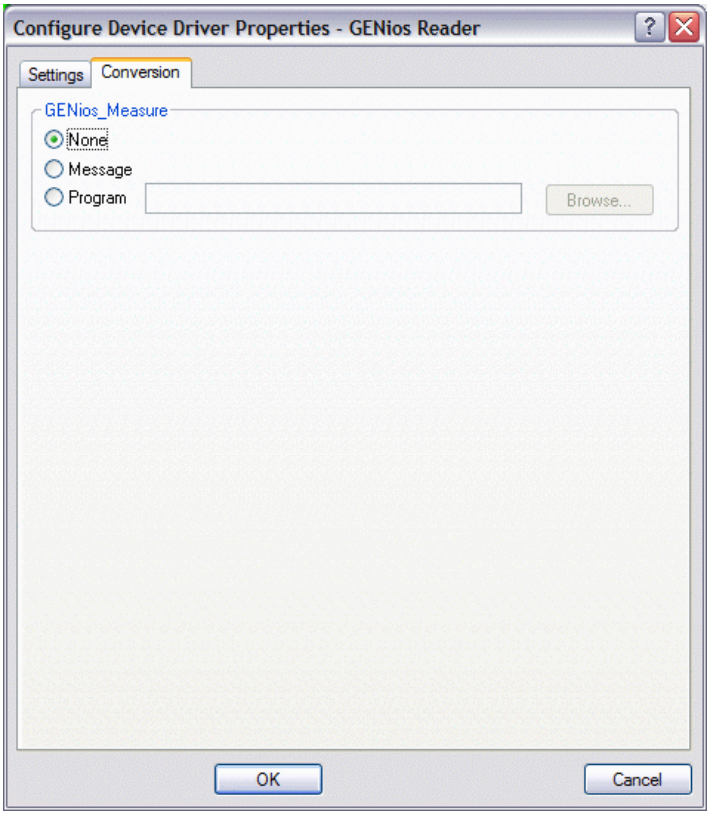


Fig. 8-64 *Conversion tab of the microplate reader driver*

Measure panel

In some cases it may be necessary to convert the reader output data to a different data format. Select Message to send a system message to any program configured to listen to the message that the measurement command has been completed and that the output data is ready for conversion. Please refer to the documentation on the Freedom EVOware Programming Interface (API) for information on developing external software which listens to Freedom EVOware system messages.

Alternatively, you can specify an external program to be executed on completion of the measurement command. Specify the path and file name of the external program directly or click Browse and choose the required program. The name of the file to be converted is passed to the external program as a command line parameter.

8.5.35 Driver Tab of the Configure Device Driver Properties Dialog Box

The *Driver* tab is used to configure, add and delete device commands. You can also specify the command execution times which should be used by the pre-scheduler during simulation.

The Commands panel lists the device commands which are available for the device you have selected (the example below is for the Ultra Reader):

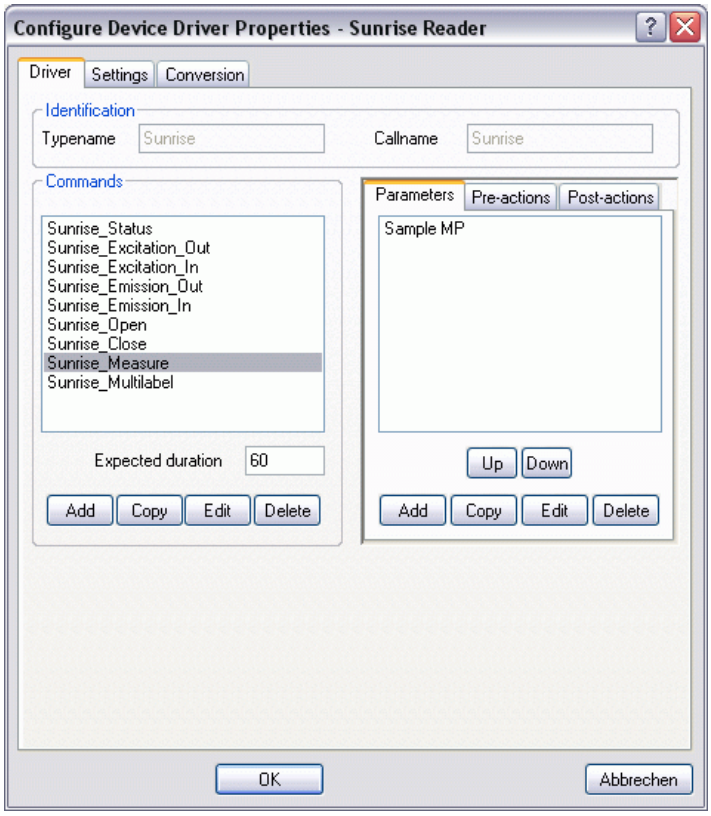


Fig. 8-65 *Configuring commands, pre-actions and post-actions*

Device commands are used to implement device-specific functions such as washing a microplate in a washer or reading a microplate in a reader. Each device has its own set of commands, whereby each device function has its own command. Please refer to the section on the respective device driver for a description of the device commands which are provided with the Freedom EVOware installation (see 16 “Device Commands”, 🗎 16-1).

8.5.35.1 Commands Panel

If you select a command, the currently configured execution time is shown in the *Expected Duration* field. If necessary, correct this value by specifying a better approximation of the command execution time. This is the value which is shown in the *Execution Time* field of the *Edit Parameters* dialog box when you add the command to your process. The execution time does not include the execution times of the pre-actions and post-actions of the command, if any (see below).

If necessary, you can fine tune the execution time for each process step individually when you add the process step to the Process Editor (see 9.10.2.1 “General Tab”, 🗎 9-71).

Click *Add* to add a new command. Then enter a name for the command and specify the default execution time in the *Edit Command* dialog box which is then shown.

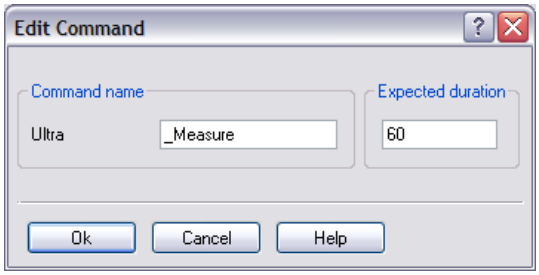


Fig. 8-66 *Edit Command dialog box*

By convention, command names start with the underline character "_". Commands are already provided for all standard device functions, so it is normally not necessary or meaningful to create new commands.

Click *EdIt* to change the name and or default execution time of the currently selected command. We only recommend you to rename new commands which you have created (and not the standard commands).

Click *Delete* to delete the currently selected command.

Note: *You can only delete commands which are not currently used in any process which is stored in the Freedom EVOware database*

8.5.35.2 Parameters Tab

Some commands perform actions on objects such as microplates. The objects are then defined as parameters of the command ("command parameters"). Click the *Parameters* tab to see the parameters of the command which is selected in the Commands panel (see Fig. 8-65, 📄 8-117).

Click *Add* to add a new parameter to the command. This opens the *Edit Parameter* dialog box:

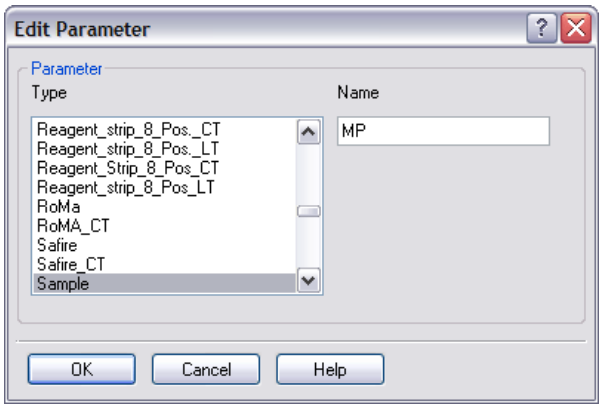


Fig. 8-67 *Edit Parameter dialog box*

The list shows all available parameter types. Choose the required parameter type from the pull-down list, specify the required value of the parameter in the *Name* field and click OK when you have made your entries.

To edit an existing parameter, select it in the Parameters tab and click *Edit* to open the *Edit Parameter* dialog box. Choose a new parameter type from the pull-down list and enter the required value of the parameter in the *Name* field.

To delete an existing parameter, select it in the Parameters tab and click *Delete*.

8.5.35.3 Pre-actions and Post-actions Tabs

In some cases it is necessary to carry out additional actions before and after the command is executed. This done using pre-actions and/or post-actions – commands which are always carried out before and after the main command. For example, if you want to scan labware in a Tecan Ultra reader with the Measure command, it is necessary to open the reader door (with the Ultra_Open command) and to move the labware to the reader using the plate robot (with the RoMa_MoveObject command). To make sure that the door is opened in time, the door must be opened before moving the labware. Another RoMa_MoveObject command and an Ultra_Close command are needed when the scanning operation is finished. The door must be closed after moving the labware.

The process diagram is simplified by implementing the additional actions as pre-actions and post-actions which are linked to the Measure command. EVOware then adds the pre-actions and post-actions to the Measure command automatically. This avoids having to specify these four additional steps for each Measure command manually.

The pre-actions and post-actions tabs list the pre-actions and post-actions which are configured for the device command which is selected in the Commands panel:

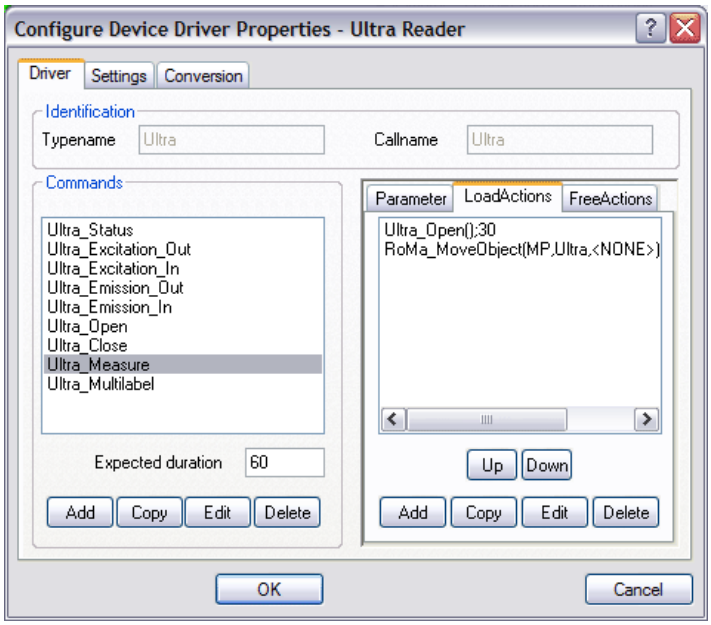


Fig. 8-68 *Configuring pre-actions and post-actions for the device command*

With few exceptions (such as Open and Close commands for reader doors), all of the standard pre-actions and post-actions are movement commands for the plate robot (RoMa_MoveObject commands). See 8.5.35.5 “RoMa_MoveObject Command”, 8-121.

Click *Delete* to delete the currently selected pre-action or post-action. Click *Copy* to copy the currently selected pre-action or post-action. The new pre-action or post-action will have the same settings as the one you copied.

Click the *Up* and *Down* buttons to change the sort order of the pre-actions and post-actions. This changes the sequence with which the pre-actions and post-actions are carried out. Taking the above example of the Measure command for the Ultra reader, the door must be opened before the plate robot brings the labware.

8.5.35.4 Editing Pre-actions and Post-actions

To edit a pre-action or post-action, click the *Pre-actions* or the *Post-actions* tab, select the required entry and click *Edit* to display the *Pre-actions / Post-actions* dialog box.

Click the *Execution Parameters* button to edit the execution parameters for the command (the settings you make only apply to the selected pre-action or post action; execution parameters for process steps are configured in the Process Editor). The *Execution Parameters* button has no effect if the command does not have any execution parameters.

To add a pre-action or post-action, click the *Pre Actions* or the *Post Actions* tab and click *Add* to display the *Pre-actions / Post-actions* dialog box:

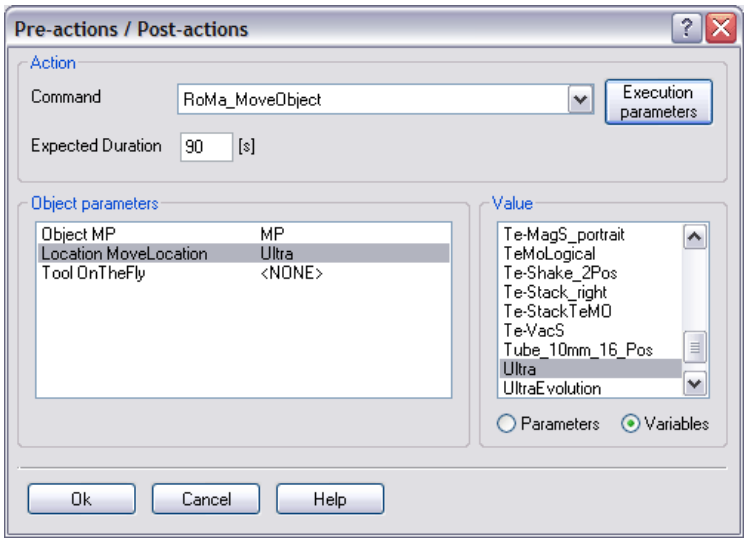


Fig. 8-69 *Editing pre-actions and post-actions*

Then choose the command to be executed as a pre-action or post-action from the pull-down list and specify its default execution time in the *Expected Duration* field. Click the *Execution Parameters* button to specify the execution parameters. If the command has any, a dialog box will appear so you can specify them.

The *Object Parameters* panel lists the parameters which are needed by the selected command. Select an object parameter and choose the required value from the list in the *Value* panel. Click the *Parameters* radio button to show pre-defined constants. Click the *Variables* radio button to show defined instances of objects.

The Value panel shows the parameters and variables which can be chosen for the selected object parameter, as follows:

Tab. 8-12 *Parameters and variables versus object parameter types*

Object parameter type	Placeholder	Variables
Object	<none> or MP	Labware site on the worktable
Location	<base> or <none>	Device or labware site
Tool	<base> or <none>	On-the-fly tool (e.g. barcode scanner)[a)]

a) *This field is normally set to <NONE>. On-the-fly tools are normally specified in the Process Editor using drag and drop.*

<base> is a placeholder which represents the original location of the object (the labware source). <none> is a placeholder to indicate that the parameter is unused.

If necessary you can specify custom pre-action and/or post-actions for each process step individually when you add the process step to the Process Editor (see 9.10.3 “Pre-actions / Post-actions (Custom)”, 9-72).

8.5.35.5 RoMa_MoveObject Command

With the exception of Open and Close commands (e.g. for reader doors), most of the pre-actions and post-actions for device commands are RoMa_MoveObject commands. They are used to move an object - typically a microplate - to and from the device. The RoMa_MoveObject command has three command parameters but does not have any pre-actions or post-actions. The three command parameters (Object, Location and Tool) are shown as three fields when you insert the command in the Process Editor:

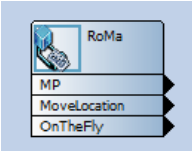


Fig. 8-70 *Specifying locations*

The above figure is shown as an example only. The RoMa_MoveObject command is normally only used for pre-actions and post-actions and is not normally used directly in the Process Editor.

See also 9.10.4 “Locations”, 9-75.

9 Specifying Your Instrument Setup

This chapter describes how to specify the setup of your pipetting instrument in Freedom EVOware. Freedom EVOware automatically detects the presence of certain instrument options by interrogating the pipetting instrument. However, it is necessary to provide Freedom EVOware with additional information which cannot be determined by interrogation – such as the dimensions and properties of the carriers and the labware (e.g. microplates) you want to use – and with other details such as the barcode types which should be accepted by the barcode scanner. The latter depend on the design of your barcode labels.

9.1 Instrument Configuration

Freedom EVOware stores information on fixed and variable parts of the pipetting instrument in an internal database and a set of configuration files. It also stores information on the dimensions of carriers and labware items and the configuration settings for the optional devices.

Note: *If you are setting up a new pipetting instrument, use the Setup & Service software to check and calibrate the reference coordinates of the hardware. This is normally done for you by the Tecan Field Service Engineer when installing the pipetting instrument and the optional devices. See 1.2 "Reference Documents", 1-3 for information on this software.*

The following lists the items you need to configure when setting up the pipetting instrument in Freedom EVOware (some of the items refer to options which may not be fitted to your instrument):

Carriers

To edit a carrier, double click on the carrier name in the Labware section of the Control Bar (see 9.5 "Configuring Carriers", 9-39).

Labware

To edit a labware item, double click on the labware name in the Labware section of the Control Bar (see 9.4 "Configuring Labware", 9-15).

Note: *The Freedom EVOware database already contains a large selection of pre-defined carrier and labware types. You only need to create or edit carriers or labware if you cannot find a standard item which is suitable for your needs.*

Vectors for the plate robot(s) and the tube robot(s)

To edit a robot vector double click on the vector name in the Robot Vectors section of the Control Bar (see 9.6 "Creating and Editing Plate Robot Vectors", 9-55 and 9.7 "Creating and Editing Tube Robot Vectors", 9-63). Appropriate robot vectors may already be provided with your Freedom EVOware installation.

Liquid Handling Arm (LiHa)

The Liquid Handling Arm is configured using the Configuration Tool (see 8.4.2.1, 8-22).

PosID

The PosID barcode scanner is configured using the Configuration Tool (see 8.4.2.2, 8-28).

MPO/SPO LICOS

The MPO/SPO LICOS system is configured using the Configuration Tool (see 8.4.2.3, 🗎 8-29).

Chemical System

The Chemical System is configured using the Configuration Tool (see 8.4.2.5, 🗎 8-30).

Doorlocks

The Doorlocks are configured using the Configuration Tool (see 8.4.2.7, 🗎 8-31).

Liquid Classes

To edit a liquid class, double click on the liquid class name in the Liquid Classes section of the Control Bar (see 10.1 “Liquid Classes Editor”, 🗎 10-1).

Device drivers

Global settings for device drivers are configured using the Configuration Tool (see 8.4 “Device Settings”, 🗎 8-21).

9.2 Basic Concepts

9.2.1 Introduction to Carriers and Labware

Freedom EVOware allows you to define an object (e.g. a microplate) *once only*, and then to use it at any required position on the worktable. This is because Freedom EVOware uses a hierarchical system for the coordinates:

- The labware coordinates are relative to the site on which the labware is placed.
- The site coordinates are relative to the carrier.
- The carrier offsets are relative to the grid position on the worktable (see also Fig. 9-17 “Carrier dimensions and X/Y offsets”, 🗎 9-46).
- The grid positions on the worktable have a periodic spacing of 25 mm.

This hierarchy allows you to place the labware at any suitable site, carrier and worktable position without having to redefine its coordinates.

The following figure shows the relationship between labware, carriers and the worktable:

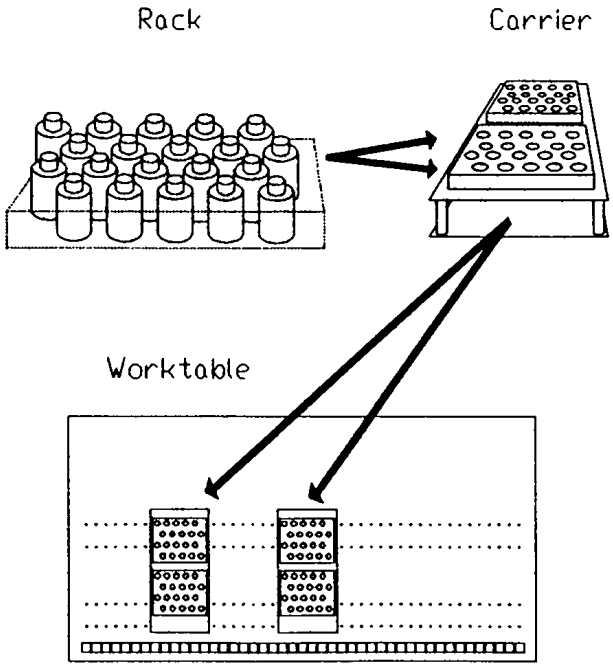


Fig. 9-1 *Labware, carrier and worktable*

When you set up the worktable for your Freedom EVOware script, you first choose a carrier with the required number of sites (see 9.5 “Configuring Carriers”, 🗎 9-39). Each of the sites can hold labware. If you cannot find the carrier you need in the Freedom EVOware database, you can define a new carrier (see 9.5 “Configuring Carriers”, 🗎 9-39).

You then choose the labware you want to use. If you cannot find the labware you need in the Freedom EVOware database, you can define a new labware item (see 9.4 “Configuring Labware”, 🗎 9-15).

In the third step you position the carriers on the worktable and place the labware onto the carriers (see 11.3.1 “Setting Up Carriers on the Worktable”, 🗎 11-2) and e.g. 11.4.1 “Choosing Labware for a Pipetting Script”, 🗎 11-4.

The procedure to follow to set up a script or process is described in detail in 11.4 “Setting Up a Pipetting Script in Freedom EVOware Standard”, 🗎 11-4 and 11.5 “Setting Up a Process in Freedom EVOware Plus”, 🗎 11-7.

9.3 Moving the Arms and Other Devices

Positions in Freedom EVOware are measured and checked by moving the LiHa, the RoMa, the PnP, the MCA, the Te-MO or the PosID to the required position by pressing keys on the numeric keypad. You can then store the current coordinates in the appropriate dialog box for the object. Positions are defined in instrument steps, i.e. the smallest unit of movement of the servo motors (0.1 mm). The pipetting instrument’s coordinate system uses three axes for the LiHa (X, Y, and Z), five axes for the RoMa (X, Y, Z, R, and G), five axes for the PnP (X, Y, Z, R, and G), four axes for the MCA96 (X, Y, Z, G), three axes for the MCA384 (X, Y, Z), five axes for the Te-MO (X, Y1, Y2, Y3 and Z) and three axes for the PosID (X, Y and B).

9.3.1 Moving the LiHa

The LiHa (Liquid Handling Arm) is mounted on the X-slide and holds the pipetting tips. On the pipetting instrument, the origin of the LiHa coordinate system (X=0, Y=0, Z=0) is the rear left of the worktable with the pipetting tips raised. The three axes of the LiHa are defined as follows:

Tab. 9-1 *Movement axes for the LiHa*

X	From left to right
Y	From rear to front
Z	From from top to bottom

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:

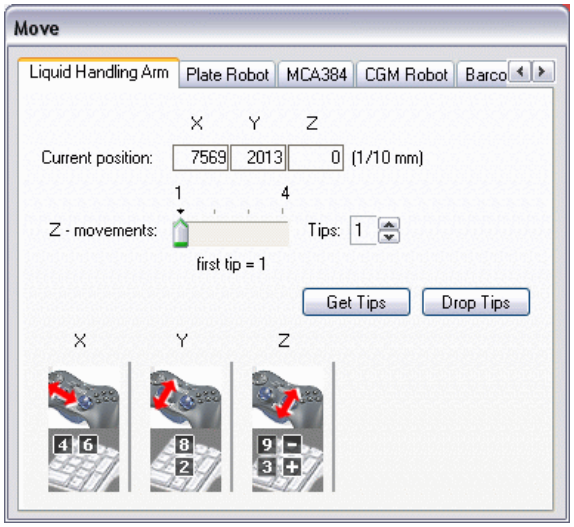


Fig. 9-2 *Move LiHa dialog box*

The LIHA tab shows the current position of the LiHa in instrument steps (0.1 mm). If your instrument is not fitted with a LiHa, the LIHA tab is not displayed unless you are running in offline mode.

The Z-movements panel lets you select which tips should be moved in the Z-direction. You can specify the first tip to move and the total number of tips to move.

Get Tips, Drop Tips

If you are teaching with DITIs, click these buttons if you want to pick up or drop the DITIs. They open the direct commands Get DITIs and Drop DITIs respectively (see 15.7 “Get DITIs Command”, 15-13 and 15.8 “Drop DITIs Command”, 15-14). The DITIs must be fetched using these buttons (or using the direct commands) and not by using any other method such as mounting by hand.

If necessary, e.g. when teaching a position, you can move the LiHa manually using the numeric keypad (make sure that the NUM Lock key is pressed):

Tab. 9-2 *Moving the LiHa using the keys on the numeric keypad*

	8 : rear (-Y)	**9** : up (-Z)
4 : left (-X)		**6** : right (+X)
	2 : front (+Y)	**3** : down (+Z)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

Note: *You cannot use the cursor keys to move the arm since they have default functions in Windows applications.*

9.3.2 Moving the RoMa (Plate Robot)

The RoMa (Robot Manipulator Arm) is a robot arm with gripper fingers that can grip and move objects such as microplates. On the pipetting instrument, the origin of the RoMa coordinate system (X=0, Y=0, Z=0) is the rear left of the worktable with the gripper raised and pointing towards the front of the instrument. The five axes of the RoMa are defined as follows:

Tab. 9-3 *Movement axes for the RoMa*

X	From left to right
Y	From rear to front
Z	From top to bottom
R	Clockwise rotation of the gripper when viewed from above
G	From narrow to wide gripper distance

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:

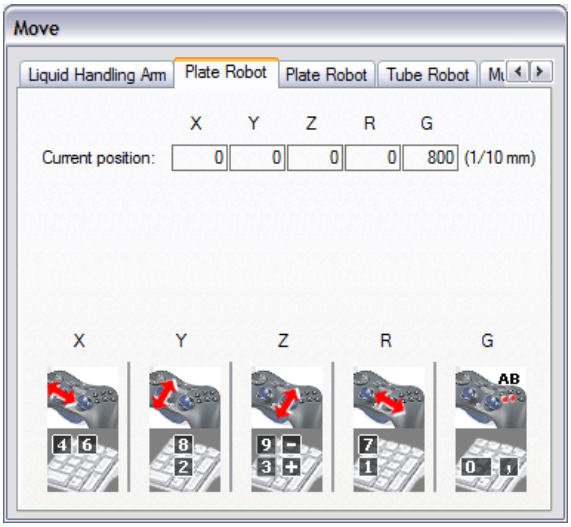


Fig. 9-3 *Move RoMa dialog box*

The Plate Robot tab shows the current position of the RoMa in instrument steps (0.1 mm). The R parameter (gripper rotation) is measured in 0.1° steps. If your instrument is not fitted with a RoMa, the Plate Robot tab is not displayed unless you are running in offline mode.
If necessary, e.g. when teaching a position, you can move the RoMa manually using the numeric keypad (make sure that the NUM Lock key is pressed):

Tab. 9-4 *Moving the RoMa using the keys on the numeric keypad*

7 : clockwise (+R)	**8** : rear (-Y)	**9** : up (-Z)
4 : left (-X)		**6** : right (+X)
1 : counterclockwise (-R)	**2** : front (+Y)	**3** : down (+Z)
0 : narrow (-G)		**,** : wide (+G)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

Note: *You cannot use the cursor keys to move the arm since they have default functions in Windows applications.*

9.3.3 Moving the PnP (Tube Robot)

The PnP (Pick and Place) is a robot arm with gripper fingers that can grip and move small objects such as tubes. On the pipetting instrument, the origin of the PnP coordinate system (X=0, Y=0, Z=0) is the rear left of the worktable with the gripper raised. The five axes of the PnP are defined as follows:

Tab. 9-5 *Movement axes for the PnP*

X	From left to right
Y	From rear to front
Z	From top to bottom
R	Clockwise rotation of the gripper when viewed from above
G	From narrow to wide gripper distance

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:

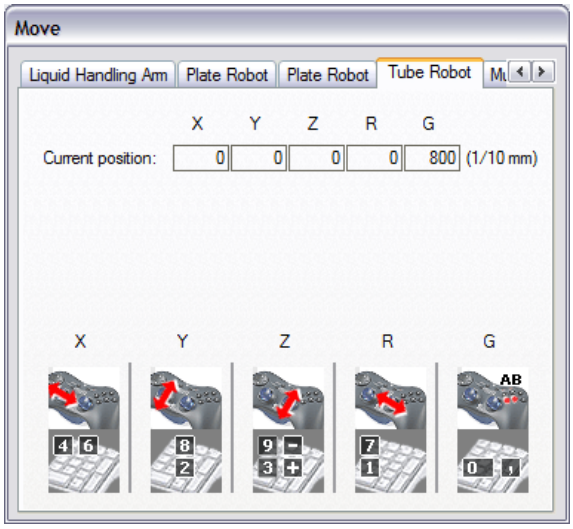


Fig. 9-4 *Move PnP dialog box*

The Tube Robot tab shows the current position of the PnP in instrument steps (0.1 mm). If your instrument is not fitted with a PnP, the Tube Robot tab is not displayed unless you are running in offline mode.

If necessary, e.g. when teaching a position, you can move the PnP manually using the numeric keypad (make sure that the NUM Lock key is pressed):

Tab. 9-6 *Moving the PnP using the keys on the numeric keypad*

7 : clockwise (+R)	**8** : rear (-Y)	**9** : up (-Z)
4 : left (-X)		**6** : right (+X)
1 : counterclockwise (-R)	**2** : front (+Y)	**3** : down (+Z)
0 : narrow (-G)		**,** : wide (+G)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

Note: *You cannot use the cursor keys to move the arm since they have default functions in Windows applications.*

9.3.4 Moving the MCA96

The MCA96 (Multi Channel Arm 96) is a special liquid handling arm which is fitted with a 96-tip pipetting head. It is mounted on the X-slide and can be optionally fitted with gripper fingers to allow it to pick up and move labware. In contrast to the RoMa, the gripper fingers cannot be rotated (they are always parallel to the X axis of the pipetting instrument).

On the pipetting instrument, the origin of the MCA96 coordinate system (X=0, Y=0, Z=0) is the rear left of the worktable with the pipetting tips raised. The four axes of the MCA96 are defined as follows:

Tab. 9-7 *Movement axes for the MCA96*

X	From left to right
Y	From rear to front
Z	From from top to bottom
G	From narrow to wide gripper distance

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:

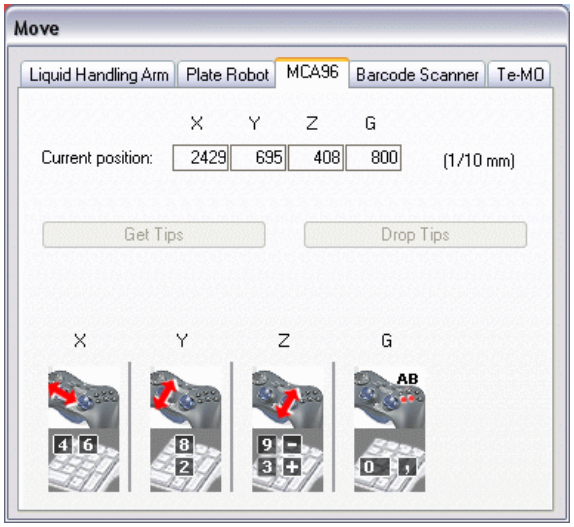


Fig. 9-5 *Move MCA96 dialog box*

The MCA96 tab shows the current position of the MCA96 in instrument steps (0.1 mm). If your instrument is not fitted with a MCA, the MCA96 tab is not displayed unless you are running in offline mode.

Get Tips, Drop Tips

If you are teaching labware with wells (such as microplates), click these buttons if you want to pick up or drop a tipblock or some DITIs. These buttons are inactive (grey) if you teach an MCA96 tipblock or MCA96 DITI labware.

If necessary, e.g. when teaching a position, you can move the MCA96 manually using the numeric keypad (make sure that the NUM Lock key is pressed):

Tab. 9-8 *Moving the MCA96 using the keys on the numeric keypad*

7 :	**8** : rear (-Y)	**9** : up (-Z)
4 : left (-X)		**6** : right (+X)
1 :	**2** : front (+Y)	**3** : down (+Z)
0 : narrow (-G)		**,** : wide (+G)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

Note: *You cannot use the cursor keys to move the arm since they have default functions in Windows applications.*

9.3.5 Moving the MCA384

The MCA384 (Multi Channel Arm MCA384) is a special liquid handling arm which can be fitted with a 96-tip or 384-tip pipetting head. It is mounted on the X-slide and can be optionally fitted with a gripper module (CGM, common gripper module) which can be used to pick up and move labware. The gripper module can be rotated.

On the pipetting instrument, the origin of the MCA384 coordinate system (X=0, Y=0, Z=0) is the rear left of the worktable with the pipetting tips raised. The three axes of the MCA384 are defined as follows:

Tab. 9-9 *Movement axes for the MCA384*

X	From left to right
Y	From rear to front
Z	From from top to bottom

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:

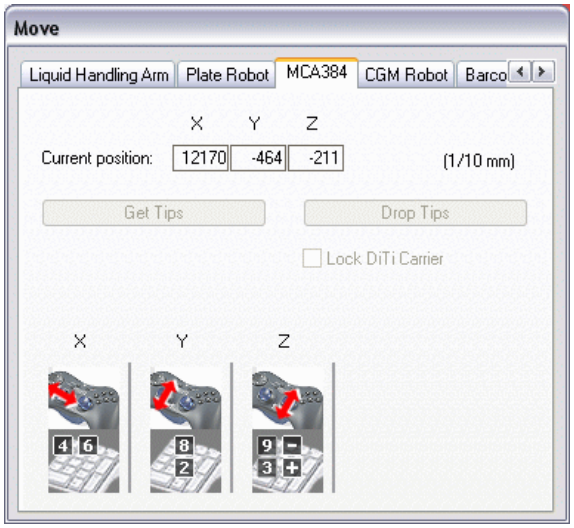


Fig. 9-6 *Move MCA384 dialog box*

The MCA384 tab shows the current position of the MCA384 in instrument steps (0.1 mm). If your instrument is not fitted with an MCA384, the MCA384 tab is not displayed unless you are running in offline mode.

Get Tips, Drop Tips

If you are teaching labware with wells (such as microplates), click these buttons if you want to to pick up some DITIs. The pipetting head must already be fitted with a suitable head adapter for DITIs. These buttons cannot be used to pick up a head adapter with fixed tips. These buttons are inactive (grey) if you teach an MCA384 head adapter or MCA384 DITI labware.

Lock DITI carrier

Check this checkbox to lock the DITI carrier in place before picking up the DITIs. The DITI carrier should normally be locked before picking up the DITIs except for special applications.

If necessary, e.g. when teaching a position, you can move the MCA384 manually using the numeric keypad (make sure that the NUM Lock key is pressed):

Tab. 9-10 *Moving the MCA384 using the keys on the numeric keypad*

7 :	**8** : rear (-Y)	**9** : up (-Z)
4 : left (-X)		**6** : right (+X)
1 :	**2** : front (+Y)	**3** : down (+Z)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

Note: *You cannot use the cursor keys to move the arm since they have default functions in Windows applications.*

9.3.6 Moving the CGM

The CGM (Common Gripper Module) is a robot arm with gripper fingers that can grip and move objects such as microplates. It is a hardware option for the MCA384 (Multi Channel Arm 384). The gripper module can be rotated.

On the pipetting instrument, the origin of the CGM coordinate system (X=0, Y=0, Z=0) is the rear left of the worktable with the gripper raised and pointing towards the front of the instrument. The five axes of the CGM are defined as follows:

Tab. 9-11 *Movement axes for the CGM*

X	From left to right
Y	From rear to front
Z	From top to bottom
R	Clockwise rotation of the gripper when viewed from above
G	From narrow to wide gripper distance
MCH_Y	Y position of the MCA384 pipetting head

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:

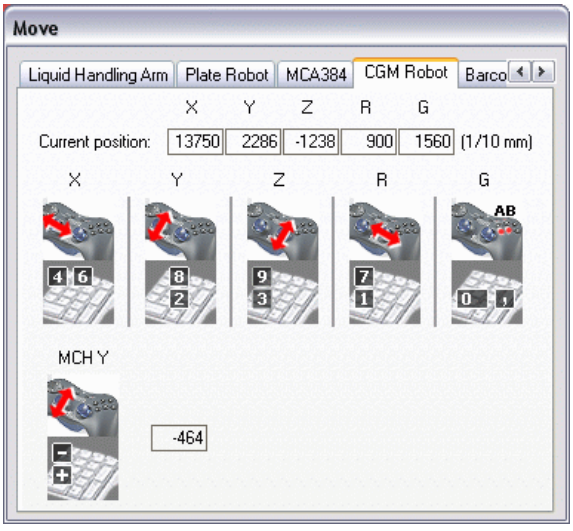


Fig. 9-7 *Move CGM dialog box*

The CGM tab shows the current position of the CGM in instrument steps (0.1 mm). The R parameter (gripper rotation) is measured in 0.1° steps. When you teach a CGM vector, Freedom EVOware also needs to know the Y position of the MCA384 pipetting head (MCH Y) to ensure that the CGM will not collide with the MCA384 as it moves.

If your instrument is not fitted with a CGM, the CGM tab is not displayed unless you are running in offline mode.

If necessary, e.g. when teaching a position, you can move the CGM manually using the numeric keypad (make sure that the NUM Lock key is pressed):

Tab. 9-12 *Moving the CGM using the keys on the numeric keypad*

7 : clockwise (+R)	**8** : rear (-Y)	**9** : up (-Z)
4 : left (-X)		**6** : right (+X)
1 : counterclockwise (-R)	**2** : front (+Y)	**3** : down (+Z)
0 : narrow (-G)		**,** : wide (+G)

Tab. 9-13 *Moving the MCA384 pipetting head using the keys on the numeric keypad*

- : rear (-Y)
+ : front (+Y)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

Note: *You cannot use the cursor keys to move the arm since they have default functions in Windows applications.*

9.3.7 Moving the Te-MO

Moving the Te-MO (Tecan Multi-pipetting Option) is similar to moving the LiHa or RoMa. The five axes of the Te-MO are defined as follows:

Tab. 9-14 *Movement axes for the Te-MO*

X	Te-MO head, from left to right
Y1	Left slide, from rear to front
Y2	Middle slide, from rear to front
Y3	Right slide, from rear to front
Z	Te-MO head, from top to bottom

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:

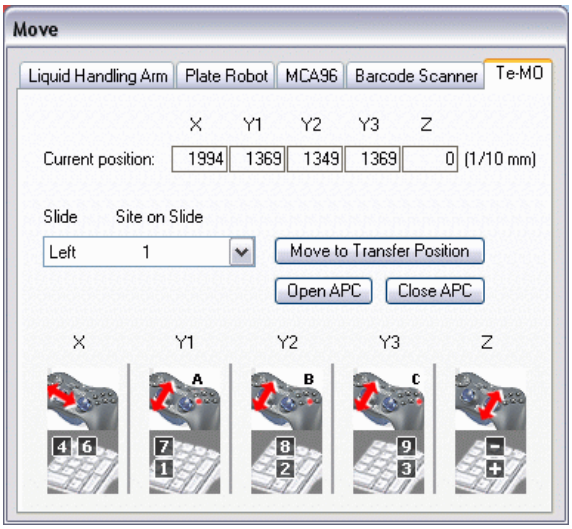


Fig. 9-8 *Move Te-MO dialog box*

The Te-MO tab shows the current position of the Te-MO in instrument steps (0.1 mm). If your instrument is not fitted with a Te-MO, the Te-MO tab is not displayed unless you are running in offline mode.

To move a specified Te-MO site to the RoMa transfer position (also called the exchange position), for example to test a RoMa (plate robot) vector or to exchange labware manually, select the slide and site from the pop-up list and click *Move to Transfer Position*. In this position, the LiHa or RoMa can access the specified site without colliding with the Te-MO pipetting head. When the Te-MO reaches the transfer position and you are using an APC (Active Positioning Carrier), click *Open APC* to release the labware. Click *Close APC* to lock the labware in position again. You can only release or lock the labware at the transfer position.

If necessary, e.g. when teaching a position, you can move the Te-MO pipetting head and slides manually using the numeric keypad (make sure that the NUM Lock key is pressed):

Tab. 9-15 *Moving the Te-MO using the keys on the numeric keypad*

7 : Y1 rear (-Y)	**8** : Y2 rear (-Y)	**9** : Y3 rear (-Y)	**-** : up (-Z)
4 : left (-X)		**6** : right (+X)	**+** : down (+Z)
1 : Y1 front (+Y)	**2** : Y2 front (+Y)	**3** : Y3 front (+Y)	

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

Note: *You cannot use the cursor keys to move the arm since they have default functions in Windows applications.*

9.3.8 Moving the PosID Barcode Scanner

The PosID (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. The PosID is installed at the rear of the pipetting instrument and is provided with a gripper which pulls the carrier towards the rear for barcode identification and then slides the carrier back into the pipetting position. The scanning head hinges to read barcodes which are attached to horizontal or vertical surfaces.

Moving the PosID is similar to moving the LiHa or RoMa. On the pipetting instrument, the origin of the PosID coordinate system (X=0, Y=0, B=0) is the rear left of the worktable with the carrier gripper towards the front.

Note: *The description in this section also applies to the PosID-3.*

The three axes of the PosID are defined as follows:

Tab. 9-16 *Movement axes for the PosID*

X	PosID, from left to right
Y	PosID carrier gripper, from front to rear
B	PosID scanner head, tilt head from vertical to horizontal

When editing an object for which a position has to be specified, an additional dialog box appears which helps you to specify certain movements:

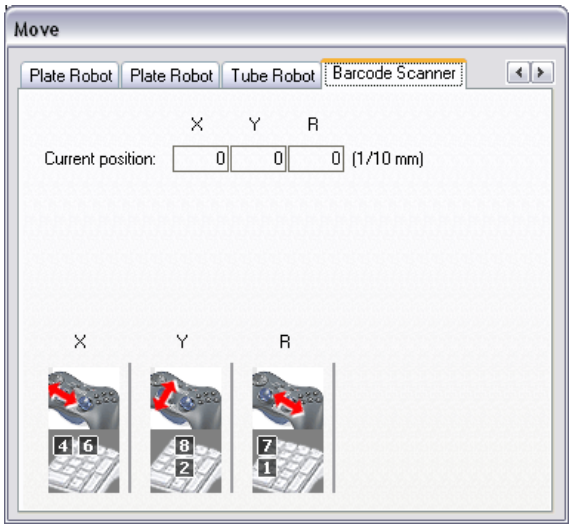


Fig. 9-9 *Move Barcode Scanner dialog box*

The Barcode Scanner tab shows the current position of the PosID in instrument steps (0.1 mm). If your instrument is not fitted with a PosID, the Barcode Scanner tab is not displayed. The Barcode Scanner tab is not displayed either if you are running Freedom EVOware in offline mode. The Move Barcode Scanner dialog box is not intended for the Symbol barcode scanner, which cannot be moved.

If necessary, e.g. when teaching a position, you can move the PosID manually using the numeric keypad (make sure that the NUM Lock key is pressed):

Tab. 9-17 *Moving the PosID using the keys on the numeric keypad*

7 :	**8** : front (-Y)	**9** : tilt to vertical (-B)
4 : left (-X)		**6** : right (+X)
	2 : rear (+Y)	**3** : tilt to horizontal (+B)

Each time you press one of these keys, the arm is moved by a single step. Keep the key pressed to move the arm by two steps per second. If you also press the CONTROL key, the arm is accelerated until it reaches a certain maximum speed.

Note: *You cannot use the cursor keys to move the arm since they have default functions in Windows applications.*

9.4 Configuring Labware

Labware refers to consumable items such as microplates or sample tubes. Microplates have a regular arrangement of containers or cavities (wells) for holding liquids or samples. During pipetting, microplates are normally placed on carriers and tubes are inserted in tube racks which are placed on carriers. Carriers are fitted to the instrument's worktable at pre-defined grid positions (see Fig. 9-1, 🗎 9-3).

Note: *The* Freedom EVOware *database already contains a large selection of pre-defined carrier and labware types. You only need to create or edit carriers or labware if you cannot find a standard item which is suitable for your needs.*

The three tabs of the following dialog box are used to configure labware (to get to this dialog box, double-click on the labware item in the Labware section of the Control Bar):

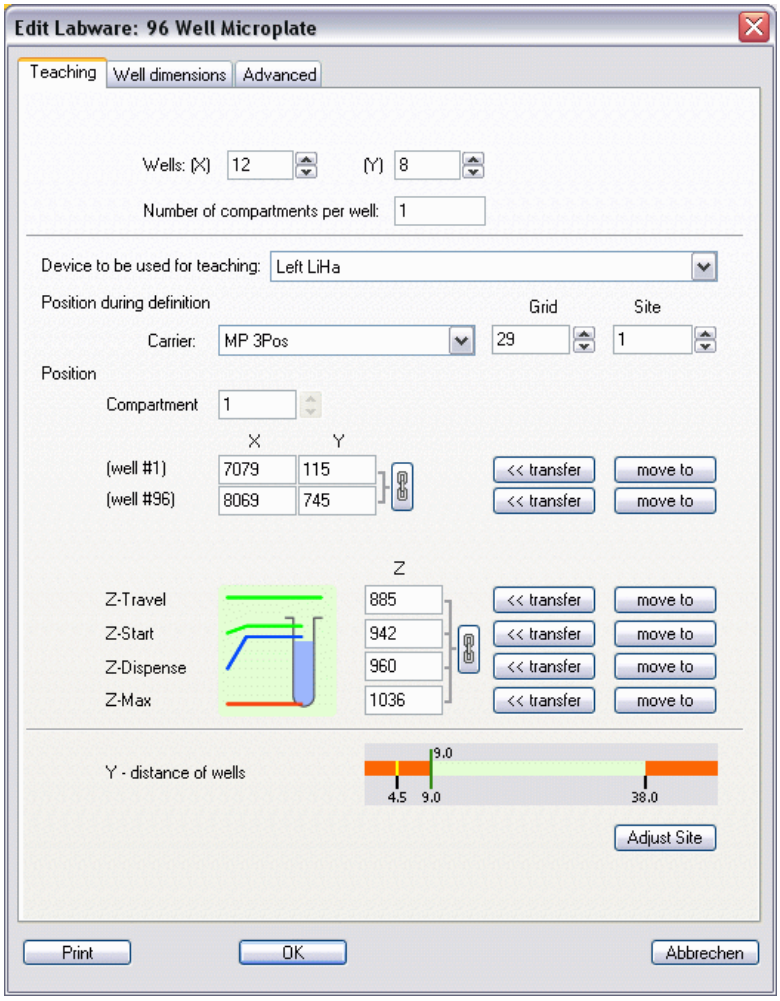


Fig. 9-10 *Edit Labware dialog box, Teaching tab*

It is recommended not to change the properties of the predefined carrier and labware types. Make a copy of the object with a new name if you want to alter any of the properties (see 5.4.1.12 “Context Menu for Objects in the Control Bar”, 5-14).

The parameters in the Teaching tab are as follows:

Wells (X), (Y)

These two fields specify the well geometry:

(X): Specify the total number of wells in the X-direction (max. 128).

(Y): Specify the total number of wells in the Y-direction (max. 128).

Number of compartments per well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Specify the number of compartments per well in this field. Specify 1 for normal labware. See also *Compartment*, below.

Device to be used for teaching

Choose the pipetting arm you want to use for teaching the dimensions of this labware item (Left LiHa, Right LiHa, MCA, MCA384 or Te-MO). The Te-MO option is only available if you have chosen labware on the Te-MO and Freedom EVOware is running in real mode (and attached to a Te-MO) or you are using the 3D simulation tool EVOSim.

If your pipetting instrument is only fitted with DITIs (disposable tips), this pull-down list also shows DiTi types in brackets, for example *LiHa (DiTi 200 µl)*. You must then choose the pipetting arm and DITI type which you want to use for teaching. Freedom EVOware uses the DITI type to determine the tip length. The tip length is specified with Tip Offset in the definition of the DITI rack for this DITI type (see 9.4.1 “Editing Labware, Well Dimensions Tab”, 9-19).

If the LiHa is fitted with a mixture of fixed tips and DITIs, teaching must be carried out with the fixed tips and DITI types are not shown in the pull-down list *Device to be used for teaching*.

Position during definition

Specify the carrier, grid and site that you want to use to configure the labware: Choose the carrier from the list and then choose the grid position and the site. An easy way to choose the correct carrier, grid, site and labware is to click on the labware in the Worktable Editor. Since you will need to closely observe the movements of the liquid handling arm, you should choose a site which has good accessibility.

Position

Compartment

For special labware types which have wells with several compartments, choose the compartment you want to edit from the pull-down list. Then specify the position coordinates and the area for the selected compartment. Repeat this process for all of the compartments in the well. See *Number of compartments per well*, above, for more information. This pull-down list is inactive (gray) if the well only has one compartment.

Well positions

Eight fields are provided for you to specify the X, Y and Z positions of the wells in instrument steps (0.1 mm). See Tab. 9-18, 9-25 for more information. The positions are normally specified by manually moving the LiHa or the Te-MO pipetting head above the first and last wells of the labware and clicking the corresponding **transfer...** buttons (see 9.4.4 “Teaching the Labware Coordinates”, 9-26).

If you have chosen labware with well offsets on the *Well Dimensions* tab (Well alignment radio buttons), an additional field is shown for the Y position of the first well in column 2. See 9.4.6 “Well Alignment”, 9-33 for more information.

The green, blue and red lines illustrate the four Z positions which you have to specify. After specifying the coordinates, it is recommended to test them on another site (choose another site in the Site field and click *move to* to move the LiHa to the new site).

The “chain” buttons next to the X, Y and Z fields lock the values together:

– **Chain locked** : If a value is changed in one of the fields, the same change is also applied to the other fields in the same column. Example: If the labware is raised or lowered by exchanging a spacer plate, you can adjust all four Z parameters by the same offset in one step.

– **Chain unlocked** : The values in each of the fields can be changed independently of the other fields in the same column.

ATTENTION

Risk of the tips moving to the wrong position on the worktable.

- Choose the correct site before specifying any coordinates. Otherwise the tips might move to the wrong position on the worktable.

Y-distance of wells

Check that the Y-distance (the spacing between adjacent wells) which is shown graphically by the vertical bar lies within the green area (see 9.4.7 “Y-distance of Wells”, 9-33). If the vertical bar lies within the red area, you may have specified the coordinates incorrectly or inaccurately.

Adjust Site button

The *Adjust Site* button is used to adjust the carrier definition for a specified, single site to compensate for small manufacturing inaccuracies in a multi-site carrier without needing to switch to the Edit Carrier dialog box. To use this feature, choose the site you want to adjust and click the *Move* to buttons for Well #1 and for Z-Max to move the LiHa to the teaching position. Then fine tune the LiHa position using the numeric keypad and click *Adjust Site* to modify the carrier definition to match the current X, Y and Z coordinates. After saving your changes, they will also be visible in the Edit Carrier dialog box (the units in the Move dialog box are in 0.1 mm; the units in the Edit Carrier dialog box are in mm).

9.4.1 Editing Labware, Well Dimensions Tab

The Well dimensions tab is used to configure additional well parameters for labware:

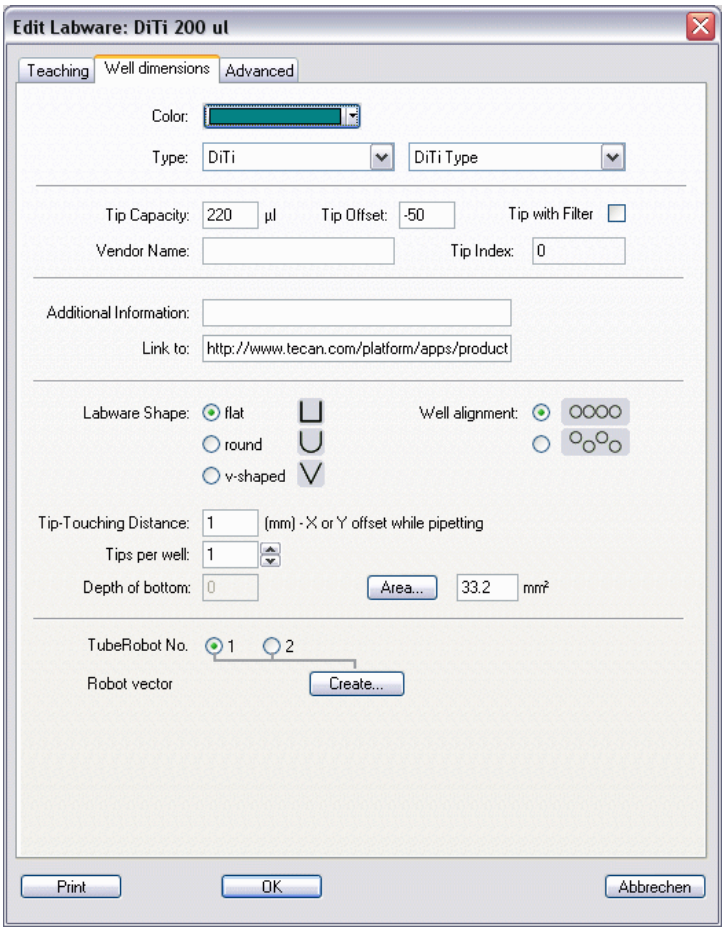


Fig. 9-11 *Edit Labware dialog box, Well Dimension tab*

The parameters in the Well dimensions tab are as follows:

Color

Choose a unique color to make it easier for you to identify this labware type in the Worktable Editor. The default labware colors are as follows:

- Labware (e.g. microplates): blue
- Racks for tubes: blue-green
- DiTi racks: violet
- Labware for the wash station: orange
- Default for all other labware types: blue

Type

Choose the labware type from the pull-down list. If necessary, choose the sub-type from the second pull-down list. See 9.4.5 “Labware Types and DITI Types”, 9-32 for more information.

Tip Capacity

This field is only shown if you are configuring a LiHa DITI rack, a Te-MO DITI rack or a Te-MO Tipblock. Specify the DITI Capacity (range: 1 to 1000 µl). To prevent contamination, Freedom EVOware limits the total aspirated volume to the specified tip capacity.

Tip Offset

This field is only shown if you are configuring a LiHa DITI rack, a Te-MO DITI rack or a Te-MO Tipblock. Specify the DITI Offset in 0.1 mm (range: 0 to 1000). The offset is used to compensate for the length differences of different tip and tipblock versions.

Tip with filter

This field is only shown if you are configuring a LiHa DITI rack, a Te-MO DITI rack or a Te-MO Tipblock. Check this checkbox if the tips are fitted with a filter. The filter serves to minimize the risk of aerosol contamination in the tip adapter or pipetting head.

Tip Index

Freedom EVOware automatically assigns a unique numeric index to each DITI type. You cannot edit the index manually. The DITI index is used e.g. by the Set DITI Type command in worklists and in advanced worklists.

Vendor Name

Specify the vendor name of the labware. In the case of DITI labware, *Vendor Name* refers to the vendor or manufacturer of the DITI tips, not the DITI rack.

The vendor name is optional and is currently intended for documentation purposes only.

If you are using the pressure-monitored pipetting (PMP) hardware option, the vendor name is stored in the pressure curve files which are created.

Additional information

This field is for information purposes only and allows you to enter some notes about this labware type.

Link to

This field is for information purposes only and is intended for the internet address (website URL) of the labware manufacturer.

Labware shape

Choose the shape of the well bottom.

Well alignment

Choose between “rectangular labware” or “rectangular labware with offset”. See 9.4.6 “Well Alignment”, 🗎 9-33 for more information.

Tip-Touching Distance (mm), X or Y offset while pipetting

This parameter is used when you activate tip touching in the liquid class. Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tip.

Freedom EVOware also uses this parameter if you select an offset (non-center) X and/or Y position for aspiration or dispensing. This is done on the Aspirate or Dispense tab of the liquid class and is mainly used for the Te-MagS.

Tips per well

This parameter specifies the number of tips which can access the well at the same time. Specify “1” for normal wells. Specify the appropriate number for troughs (e.g. “8” for a *Trough 100ml;* specify “96” or “384” for Te-MO troughs). Before Freedom EVOware inserts tips into LiHa troughs, it slides the tips together to the minimum tip-to-tip spacing of 9 mm. Use this value to calculate the number of tips which can access the well at the same time.

Depth of bottom

For a well with a v-shaped bottom, specify the vertical distance in mm from the lowest point of the v (Z-max) to the beginning of the cylindrical part of the well. This is used for volume calculations and is important for tracking (keeping the tips immersed when aspirating or dispensing). For wells with a round (hemispherical) bottom, Freedom EVOware calculates the volume of the bottom automatically.

Area

Specify the area of the well in mm². Click *Area* to display a dialog box which helps you to calculate the area from the diameter or from the length and the width.

Note: *Troughs are normally specified with length and width. In this case, click “Area”, click “Length” and enter the length and the width.*

Robot vector, Create

Click this button if you want to create or edit a tube robot vector for this labware (the button changes from Create to Edit if the robot vector has already been created). If your pipetting instrument is fitted with two tube robots, first choose the one you want to use (1 or 2). In this case you should create a vector for both tube robots. Tip: the home position for tube robot 1 is at the rear left of the pipetting instrument. Only one tube robot is shown in offline mode.

9.4.2 Editing Labware, Advanced Tab

The Advanced tab is used to configure advanced properties for labware:

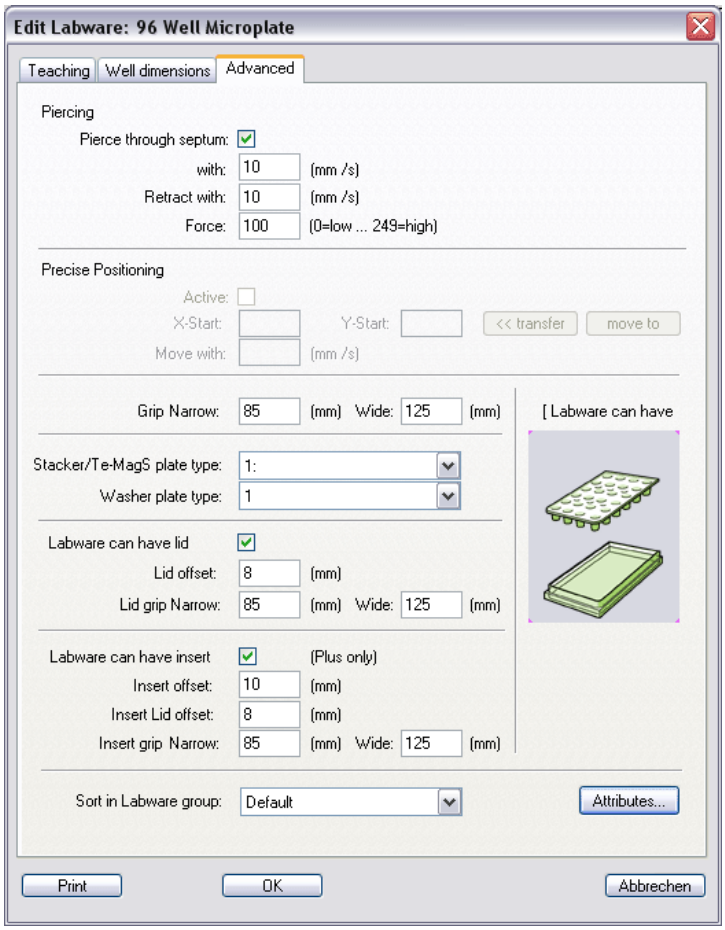


Fig. 9-12 *Edit Labware dialog box, Advanced tab*

The parameters in the Advanced tab are as follows:

Piercing panel

If you activate *Pierce through septum*, Freedom EVOware executes special movements for septum piercing when accessing the labware. It will pierce from Z-Travel to Z-Start and then retract from Z-Start to Z-Travel. Liquid level detection is not available with this option activated.

The Te-MO does not support septum piercing. If you make any entries in this panel, they will be ignored if the labware is used on the Te-MO.

Pierce with

Specify the piercing speed in mm/s.

Retract with

Specify the retract speed after piercing in mm/s.

Piercing force

Specify the required force to use for piercing the septum (range: 0 to 249).

Precise Positioning panel

If you activate this option, Freedom EVOware executes a special movement to increase positioning accuracy, e.g. for 1536 well plates. When accessing labware for the first time in a sequence of pipetting commands, it makes a normal move to X-Start/Y-Start. It then makes a high resolution move to the actual pipetting position. This sequence of movements eliminates mechanical backlash and ensures the highest possible accuracy. X-Start should be set to ca. 0.4 cm to the left of the first well of the labware. Y-Start should be set to ca. 0.4 cm behind the first well of the labware. Note: The first well is at the rear left of the labware.

Precise positioning requires LiHa firmware version 1.2 or later. You cannot use precise positioning with earlier firmware versions.

X-Start

Specify the required X-Start position for the precise X movement. Besides typing the position manually, you can teach the position by moving the LiHa to the X-Start/Y-Start position and clicking the **transfer** button. This copies the current LiHa coordinates to the X-Start and Y-Start fields. See also 9.3.1 “Moving the LiHa”, 9-4.

Y-Start

Specify the required Y-Start position for the precise Y movement. Besides typing the position manually, you can teach the position by moving the LiHa to the X-Start/Y-Start position and clicking the **transfer** button. This copies the current LiHa coordinates to the X-Start and Y-Start fields. See also 9.3.1 “Moving the LiHa”, 9-4.

Move with

Specify the speed for the precise positioning movement in mm/s.

Note: *The Te-MO does not support precise positioning. If you make any entries in this panel, they will be ignored if the labware is used on the Te-MO.*

Grip Narrow, Wide

Specify the spacing in mm between the RoMa grippers which should be used to grip the labware on the narrow side and on the wide side, respectively. To ensure a firm grip, the grippers will close by an additional 1 cm (this is limited by the specified grip force). To release the labware, the grippers will open by an additional 0.5 cm (default setting). Example: If Grip Narrow = 85 mm, the grippers will move to 90 mm to release the labware or to 75 mm to grip the labware.

Stacker plate type

Specify the plate type (from 1 to 10). This tells the stacker the plate dimensions and how to handle the plate correctly. Labels (names) can be assigned to plate types to make it easier to choose the correct plate type in the pull-down list. The labels are assigned using the *Setup & Service* software and are stored in the stacker firmware (see 1.2.1 “Related Documentation and Software”, 1-3 for information on this software.

Washer plate type

Specify the plate type (from 1 to 10). This tells the washer the plate dimensions and how to handle the plate correctly.

Labware can have lid

Check this checkbox if the labware can be fitted with a lid. Note: The lid must be removed before pipetting, for example by using the RoMa.

Lid offset

Specify the vertical distance between the bottom of the labware and the lower edge of the lid.

Lid grip narrow, wide

Specify the spacing in mm between the RoMa grippers which should be used to grip the lid on the narrow side and on the wide side, respectively. To ensure a firm grip, the grippers will close by an additional 1 cm (this is limited by the specified grip force). To release the lid, the grippers will open by an additional 0.5 cm (default setting). Example: If Grip Narrow = 85 mm, the grippers will move to 90 mm to release the lid or to 75 mm to grip the lid.

Labware can have insert

Check this checkbox if the labware can contain an insert. For more information on insert plates see 17.8 “Handling inserts in Freedom EVOware Plus”, 17-25.

Insert offset

Specify the vertical distance between the bottom of the labware and the lower edge of the insert.

Insert lid offset

Specify the vertical distance between the bottom of the insert and the lower edge of the lid.

Insert grip narrow, wide

Specify the spacing in mm between the RoMa grippers which should be used to grip and pick up the insert on the narrow side and on the wide side, respectively.

Sort in Labware group

The Labware tab in the Control Bar is subdivided into groups for Microplates, Tips, Wash and Waste, Troughs, Tubes and Miscellaneous. Choose the group where you want this labware item to be shown in the Control Bar. Choose Default to use the default Control Bar group for this labware item.

Attributes button

See 9.4.8 “Labware Attributes”, 9-34 for information on labware attributes.

9.4.3 Labware Coordinates

The following table describes the X, Y and Z coordinates in the Teaching tab of the Edit Labware dialog box:

Tab. 9-18 *X, Y and Z coordinates for labware*

Coordinate	Position / Function
X,Y	At this position, the tip is situated above the well/tube of the first/last position on the labware. See Tab. 9-19, 9-33 for additional information on labware with offsets.
Z-Travel	Tip height at which the tips move from one X/Y position to another. Choose Z-Travel to be higher than all obstacles on the carrier. Movements that pass over different pieces of labware use a tip height of Z-Travel (global) instead.
Z-Travel (global)	This parameter is also called Travel Height. When the LiHa moves over a single labware item or between adjacent identical labware items, it retracts all tips to the Z-Travel value which is specified in the labware definition. However, if two consecutive commands cause it to move over different pieces of labware, the tips are retracted to the height you specify with Travel Height in the Configuration Tool (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22). This is done to speed up and optimize LiHa movements. Choose this parameter to be higher than all obstacles on the woktable.
Z-Start	Tip height at which the liquid level detection (ILID) is switched on during pipetting. For tubes and containers (troughs), choose Z-Start to be at least 1 mm below the rim but above the liquid surface. For microplates, choose Z-Start to be at least 1 mm above the edge of the well. Z-Start should be chosen as low as possible to ensure fast liquid level detection. At the same time, Z-Start must be above the highest possible liquid level in the well/tube to ensure that the liquid surface is found.
Z-Dispense	Tip height at which liquid is dispensed. It should be low enough to ensure that no liquid drops can get into adjacent wells or tubes.
Z-Max	Tip height which is very slightly above the lowest point of the well, tube or container. It is the lowest position which the tip is allowed to reach without touching the bottom. When searching for the liquid surface, the pipetting instrument will search from Z-Start down to Z-Max. If the tip reaches Z-max without finding liquid, the pipetting instrument reacts according to the configured liquid level detection error mode.

The figure below illustrates the different Z positions:

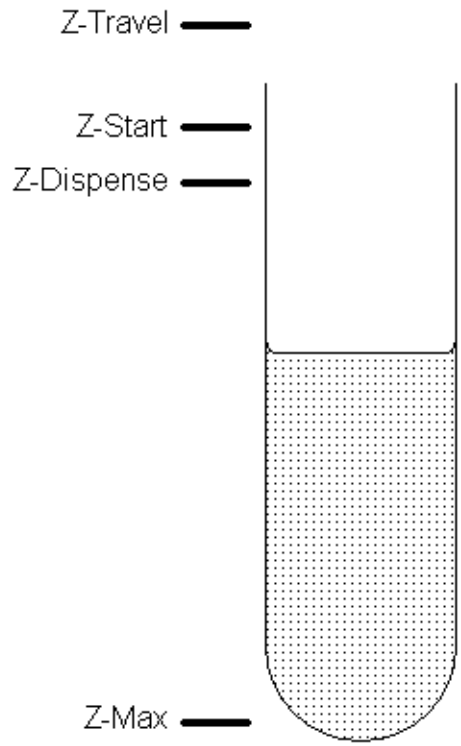


Fig. 9-13 *Z positions for a tube (example)*

9.4.4 Teaching the Labware Coordinates

Teaching is the process of showing Freedom EVOware the positions on the worktable or the Te-MO by physically moving the LiHa, MCA or the Te-MO pipetting head to the correct position above the labware and then clicking the appropriate buttons in the dialog boxes (see 9.3.1 “Moving the LiHa”, 🗎 9-4, 9.3.7 “Moving the Te-MO”, 🗎 9-12 and 9.3.4 “Moving the MCA96”, 🗎 9-8).

If the labware is intended for use on the worktable, put it on a carrier the worktable and teach it on the worktable. If the labware is intended for use on the Te-MO, put it on the Te-MO and teach it on the Te-MO.

A group of eight Position fields for the labware coordinates are shown in the Edit Labware dialog box. Next to the coordinates you can see buttons labeled with **transfer** and **move to**.

Click the **transfer** buttons to copy the current LiHa, MCA or Te-MO coordinates (as shown in the respective tab of the Move dialog box) to the position fields in the Edit Labware dialog box. Do this when you want to teach the current position.

Note: *If you click the **move to** buttons instead, this moves the LiHa, MCA or Te-MO to the coordinates shown in the Position fields of the Edit Labware dialog box. The tips first lift as far as possible, then the LiHa, MCA or Te-MO moves to the new position and the tips move back to the previous height. The corresponding tab of the Move dialog box will be updated accordingly.*

Collision avoidance is not available when teaching. Accordingly, take care when using the “Move To” button, which moves the selected arm directly to the

destination using the shortest (diagonal) path. Move other arms out of the way to avoid the risk of collisions or use the cursor keys, which are slower but safer.

9.4.4.1 Teaching with the LiHa

Specify the carrier, grid and site that you want to use to teach the labware: Choose the carrier from the list and then choose the grid position and the site. Alternatively, with the Labware Editor closed, put the labware on the worktable at the required position, right click the labware and choose Edit Labware Type from the context menu. This opens the Labware Editor with the correct settings.
In the Edit labware dialog box, choose *LiHa* from the pull-down list *Device to be used for teaching.*

Note: *If your pipetting instrument is only fitted with DITIs (disposable tips), the pull-down list also shows DiTi types in brackets, for example LiHa (DiTi 200 µl).*

⌦ Teaching the X and Y coordinates of labware on the worktable:

- Move one of the LiHa tips above the center of the first well of the labware (at the rear left of the labware) and click the corresponding **transfer** button. This copies the current LiHa X and Y coordinates to the position fields in the Edit Labware dialog box. We recommend you to use one of the middle tips for teaching (e.g. tip 3).
- Move the same LiHa tip above the center of the last well of the labware (at the front right of the labware) and click the corresponding **transfer** button. This copies the current LiHa X and Y coordinates to the position fields in the Edit Labware dialog box.
- For labware with offsets, you also need to move the LiHa above the first well of the second column and click the **transfer** button next to the field “Y2 (column 2)”. See Tab. 9-19, 🗎 9-33.

Note: *if the LiHa is fitted with DITIs, you must use the direct command “Get DITIs” (or the Get Tips button in the Move dialog box) to fetch the tips you want to teach with and not by using any other method such as mounting by hand. See 9.3.1 “Moving the LiHa”, 🗎 9-4.*
In addition, you must choose the correct pipetting arm and DiTi type in the pull-down list “Device to be used for teaching”. Freedom EVOware uses the DiTi type to determine the tip length. The tip length is specified with Tip Offset in the labware definition of the DITI rack which is used for this DITI type (see 9.4.1 “Editing Labware, Well Dimensions Tab”, 🗎 9-19).

Note: *if the LiHa is fitted with a mixture of fixed tips and DITIs, teaching must be carried out with the fixed tips and DITI types are not shown in the drop down list “Device to be used for teaching”.*

⌦ Teaching the X and Y coordinates of a LiHa Trough:

A LiHa Trough is treated as labware with only one well, whereby several tips can access the well at the same time. LiHa troughs are taught just like labware:

- Move one of the LiHa tips above the center of the trough and click the corresponding **transfer** button. This copies the current LiHa X and Y coordinates to the position fields in the Edit Labware dialog box. We recommend you to use one of the middle tips for teaching (e.g. tip 3). Do not use select than one tip when teaching the X and Y coordinates of a LiHa trough, because this can cause a collision with other objects when the trough is used in a script. Before Freedom EVOware inserts tips into LiHa troughs, it

slides the tips together to the minimum tip-to-tip spacing of 9 mm. In addition, it automatically centers the group of tips above the center of the trough.

⌦ Teaching the Z coordinates of labware on the worktable:

- Move one of the LiHa tips to the Z-Travel position above the first well of the labware (at the rear left of the labware) and click the corresponding **transfer** button. This copies the current LiHa Z coordinate to the Z-Travel field in the Edit Labware dialog box. We recommend you to use one of the middle tips for teaching (e.g. tip 3).
- Repeat this process for the Z-Dispense, Z-Start and Z-Max positions.

⌦ Teaching labware on the Te-MO with the LiHa

The basic procedure to follow is similar to teaching labware on the worktable with the LiHa. However, teaching can only be done on sites 3 or 13 for a Te-MO 3x5 and sites 2 or 8 for a Te-MO 3x3. In addition, to ensure that the LiHa can access the site, you must move the site you want to teach with to the RoMa transfer position.

Collision avoidance is not available when teaching. Accordingly, take care when using the “Move To” button, which moves the selected arm directly to the destination using the shortest (diagonal) path. Move other arms out of the way to avoid the risk of collisions or use the cursor keys, which are slower but safer.

Proceed as follows (the example is for site 3 of the Te-MO 3x5):

- Make sure that the fixed tips or DITIs you want to use for teaching are already mounted on the LiHa.
- Put the labware on site 3 of the Te-MO and on the Freedom EVOware worktable.
- Right-click site 3, choose Edit Labware Type and choose “LiHa”.
- In the Te-MO tab of the Move dialog box, move the Te-MO pipetting head to the right-hand side using the cursor keys. See 9.3.7 “Moving the Te-MO”, 🗎 9-12.
- In the Te-MO tab of the Move dialog box, choose “Left / 3” from the pull-down list and click *Move to transfer position*. If necessary, move other arms out of the way to avoid the risk of collisions.
- In the LiHa tab of the Move dialog box, move the LiHa to site 3 of the Te-MO using the cursor keys. See 9.3.1 “Moving the LiHa”, 🗎 9-4.
- Teach the X, Y and Z coordinates of the MCA as described in “Teaching the X and Y coordinates of labware on the worktable, above.

See Tab. 8-9 “Te-MO 3x5 site numbers”, 🗎 8-104 and Tab. 8-10 “Te-MO 3x3 site numbers”, 🗎 8-104 for information on Te-MO site numbers.

9.4.4.2 Teaching with the Te-MO pipetting head

Specify the carrier, grid and site that you want to use to teach the labware: Choose the carrier from the list and then choose the grid position and the site. Alternatively, with the Labware Editor closed, put the labware on the worktable at the required position, right click the labware and choose Edit Labware Type from the context menu. This opens the Labware Editor with the correct settings.

In the Edit labware dialog box, choose *Te-MO* from the pull-down list *Device to be used for teaching*.

⌦ Teaching the X and Y coordinates of labware on the Te-MO:

- Move the Te-MO pipetting head to position the rear left tip above the center of the first well of the labware (at the rear left of the labware) and click the corresponding **transfer** button. This copies the current Te-MO X and Y coordinates to the position fields in the dialog box.
- Move the Te-MO pipetting head to position the front right tip above the center of the last well of the labware (at the front right of the labware) and click the corresponding **transfer** button. This copies the current Te-MO X and Y coordinates to the position fields in the dialog box.
- For labware with offsets, you also need to move the Te-MO pipetting head to position the rear left tip above the center of the first well of the second column and click the **transfer** button next to the field “Y2 (column 2)”. See Tab. 9-19, 🗎 9-33.

⌦ Teaching the Z coordinates of labware on the Te-MO:

- Move the Te-MO pipetting head to position the rear left tip above the first well of the labware (at the rear left of the labware) and click the corresponding **transfer** button. This copies the current Te-MO Z coordinate to the Z-Travel field in the Edit Labware dialog box.
- Repeat this process for the Z-Dispense, Z-Start and Z-Max positions.

⌦ Teaching the X and Y coordinates of labware on the Te-MO 96 Wash Block:

A teaching block is available which simplifies teaching the coordinates of the Te-MO 96 Wash Block using the Te-MO pipetting head. Formerly, teaching was difficult due to the restricted visibility and the view perspective. Using the teaching block, teaching is done at an offset to the actual positions of the wash block.
Proceed as follows when teaching the coordinates of the Te-MO 96 Wash Block:

Teaching with the Te-MO 96 Wash Block (teaching without offset)

- Make sure the wash block is fitted.
- In the Edit labware dialog box, choose *Te-MO* from the pull-down list *Device to be used for teaching*.
- Teach the X, Y and Z coordinates as described in *Teaching the X and Y coordinates of labware on the Te-MO* and *Teaching the Z coordinates of labware on the Te-MO*, above. The tips should be lowered into the channels of the wash block when teaching.

Teaching with the teaching block (teaching with offset).

- Fit the teaching block before you start teaching.
- In the Edit labware dialog box, choose *Te-MO with offset* from the pull-down list *Device to be used for teaching*.
- Teach the X and Y coordinates as described in *Teaching the X and Y coordinates of labware on the Te-MO*. The tips should be aligned with the offset points of the teaching block.
- Teach the Z coordinates as described in *Teaching the Z coordinates of labware on the Te-MO*, above. The tips should be lowered into the channels of the teaching block when teaching.

See Tab. 8-9 “Te-MO 3x5 site numbers”, 🗎 8-104 and Tab. 8-10 “Te-MO 3x3 site numbers”, 🗎 8-104 for information on Te-MO site numbers.

9.4.4.3 Teaching with the MCA96 and the MCA384

Specify the carrier, grid and site that you want to use to teach the labware: Choose the carrier from the list and then choose the grid position and the site. Alternatively, with the Labware Editor closed, put the labware on the worktable at the required position, right click the labware and choose Edit Labware Type from the context menu. This opens the Labware Editor with the correct settings.

In the Edit labware dialog box, choose *MCA96* or *MCA384* from the pull-down list *Device to be used for teaching.*

⌦ Teaching the X and Y coordinates of labware on the worktable:

- Move the MCA pipetting head to position the rear left tip above the center of the first well of the labware (at the rear left of the labware) and click the corresponding **transfer** button. This copies the current MCA X and Y coordinates to the position fields in the dialog box.
- Move the MCA pipetting head to position the front right tip above the center of the last well of the labware (at the front right of the labware) and click the corresponding **transfer** button. This copies the current MCA X and Y coordinates to the position fields in the dialog box.
- For labware with offsets, you also need to move the MCA pipetting head to position the rear left tip above the center of the first well of the second column and click the **transfer** button next to the field “Y2 (column 2)”. See Tab. 9-19, 🗎 9-33.

⌦ Teaching the Z coordinates of labware on the worktable:

- Move the MCA pipetting head to position the rear left tip above the first well of the labware (at the rear left of the labware) and click the corresponding **transfer** button. This copies the current MCA Z coordinate to the Z-Travel field in the Edit Labware dialog box.
- Repeat this process for the Z-Dispense, Z-Start and Z-Max positions.

⌦ Teaching labware on the Te-MO with the MCA96 and the MCA384

The basic procedure to follow is similar to teaching labware on the worktable with the MCA. However, teaching can only be done on sites 3 or 13 for a Te-MO 3x5 and sites 2 or 8 for a Te-MO 3x3. In addition, to ensure that the MCA can access the site, you must move the site you want to teach with to the RoMa transfer position.

Collision avoidance is not available when teaching. Accordingly, take care when using the “Move To” button, which moves the selected arm directly to the destination using the shortest (diagonal) path. Move other arms out of the way to avoid the risk of collisions or use the cursor keys, which are slower but safer.

Proceed as follows (the example is for site 3 of the Te-MO 3x5):

- Put the labware on site 3 of the Te-MO and on the Freedom EVOware worktable.
- Right-click site 3, choose Edit Labware Type and choose “MCA”.
- In the Te-MO tab of the Move dialog box, move the Te-MO pipetting head to the right-hand side using the cursor keys. See 9.3.7 “Moving the Te-MO”, 🗎 9-12.
- In the Te-MO tab of the Move dialog box, choose “Left / 3” from the pull-down list and click *Move to transfer position*. If necessary, move other arms out of the way to avoid the risk of collisions.

- In the MCA tab of the Move dialog box, click Get Tips and choose the tipblock to use or the DITI rack containing the DITIs. See 9.3.4 “Moving the MCA96”, 9-8.
- In the MCA tab of the Move dialog box, move the MCA to site 3 of the Te-MO using the cursor keys.
- Teach the X, Y and Z coordinates of the MCA as described in “Teaching the X and Y coordinates of labware on the worktable, above.
- In the Multi Channel Arm tab of the Move dialog box, click Drop Tips to drop the tipblock or the DITIs.

See Tab. 8-9 “Te-MO 3x5 site numbers”, 8-104 and Tab. 8-10 “Te-MO 3x3 site numbers”, 8-104 for information on Te-MO site numbers.

9.4.4.4 Additional information on teaching with the MCA384

This section describes how to teach DITI racks using a teaching pin and how to teach head adapters. See also 9.5.4 “Teaching the MCA384 System Carrier with DITI Racks”, 9-47.

⌦ Teaching MCA384 DITI racks using the teaching pin

A teaching pin is available from Tecan which simplifies teaching the coordinates of MCA384 DITI racks.

Before you start teaching, mount the head adapter “Adapter DiTi Combo MCA384” or the “Adapter Combo MCA384” with the direct command MCA384 Get Head Adapter. Then proceed as follows:

- Insert the teaching pin into a DITI mounting hole at one of the four corners of the head adapter.
- Open the Edit Labware dialog box and check the *Use teaching pin* checkbox. This checkbox is only available if you are teaching an MCA384 DITI rack, and causes the plunger in the pipetting head to be retracted. This produces a vacuum which holds the teaching pin in place. In addition, the fields for Z-Dispense and Z-Max can no longer be edited.
- Remove the four adjacent DITIs from the same corner of the DITI rack to make room for the teaching pin.
- During teaching, lower the pipetting head until the teaching pin is inserted into the DITI rack as far as it will go.
- In the Edit Labware dialog box, click the Transfer button for well #1.
- In the Edit Labware dialog box, click the Transfer button for Z-Start. The values for Z-Dispense and Z-Max will be adjusted automatically.
- Click OK when you are finished.

⌦ Teaching a head adapter with the head adapter mounted

You can also teach the pipetting head with the head adapter already mounted on the pipetting head. Before you start teaching, check that the head adapter is mounted. Then proceed as follows:

- Select the head adapter in the Worktable Editor and open the Edit Labware dialog box.
- A checkbox “Use fetched head adapter” is shown to indicate that the head adapter is mounted. This checkbox cannot be unchecked. In addition, the fields for Z-Dispense and Z-Max cannot be edited.
- Move the pipetting head with the head adapter to position it on top of the support shoe on the system carrier.
- In the Edit Labware dialog box, click the Transfer button for Z-Start. The values for Z-Dispense and Z-Max will be adjusted automatically.

- Click OK when you are finished.

⌦ Teaching a head adapter without mounting it first

Put the head adapter onto the support shoe on the system carrier and move the pipetting head over the head adapter until the clamps are just touching the front edge of the head adapter. The front edge of the clamps on the pipetting head must be aligned with the front edge of the head adapter. In the X direction, the center line of the pipetting head should be above the center line of the head adapter. This Z position of the pipetting head now corresponds to Z-Start (which is the same as Z-Dispense).

- In the Edit Labware dialog box, click the Transfer buttons for Z-Start and Z-Dispense.
- Specify a value for Z-Max which is 45 higher than the value for Z-Start. This corresponds to a head position which is 4.5 mm lower.
- Click OK when you are finished.

9.4.5 Labware Types and DITI Types

When you choose the labware type on the *Well Dimensions* tab of the Edit Labware dialog box, in some cases you also have to select the intended usage of the labware in a second pull-down list. Current Tecan pipetting instruments support the following labware types:

- Regular
- DITI:
  - DITI Type or DITI Waste.
- Muiti-pipetting head:
  - Te-MO DITI, Te-MO Tipblock, Te-MO DITI Waste, Te-MO Wash station or Te-MO Trough.
  - These labware types should also be used for MCA96 DITIs, MCA96 Tipblocks, the MCA96 Wash Block and MCA96 Troughs.
- MCA384 (Multi Channel Arm 384):
  - MCA384 DITI, MCA384 Fixed Tips, MCA384 Wash Station or MCA384 Head Adapter.
- Washer (wash station):
  - Cleaner Short, Cleaner Long or Waste (all of these items are part of a wash station).
  - Cleaner LowVol (part of a LowVol wash station).
- System (this labware type is used internally and should not be selected).
- Te-PS Sensor Plate.

DITI Types

When you choose a DITI type in a script command, the pull-down list all of the LiHa DITI types which are currently configured in the labware database. When you want to pick up a DiTi, Freedom EVOware searches the worktable for a DITI rack which contains the DITI type you have specified in the script command.

To configure Freedom EVOware for a new DITI type, create a new DITI rack or duplicate an existing DITI rack and give the new labware a suitable name (e.g. “ZipTip”).

Note: *DITI racks are also used to store ZipTips.*

Note: *Te-MO DITI racks should be configured with the labware type “Te-MO DITI”, not “DITI”.*

DiTi Index

Freedom EVOware automatically assigns a unique numeric index to each DITI type. You cannot edit the index manually. The DITI index is used e.g. by the Set DITI Type command in worklists and in advanced worklists. The DITI index is shown in the Edit Labware dialog box for the DITI labware (Well Dimensions tab).

Te-PS

This labware type Te-PS must only be used for the Te-PS Sensor Plate. The Te-PS Sensor Plate is used by the Manual Tip Alignment function (see 15.27 “Manual Tip Alignment Command”, 15-57) and the Tip Alignment Check command (see 15.20 “Tip Alignment Check Command”, 15-30).

9.4.6 Well Alignment

The following table describes the two styles of well alignment supported by Freedom EVOware:

Tab. 9-19 *Well alignment*

Type	Name	Comment
	Rectangular labware	This is labware where the wells are arranged in regular rows and columns, e.g. a standard microplate. The first well is rear left; the last well is right front.
	Rectangular labware with offset	This labware is similar to the rectangular type, but every second column is displaced in the +Y direction. The spacing of the wells in the Y direction is the same for all columns. In addition to specifying the X and Y positions of the first and the last well, you must also specify the Y position of the first well in the second row in the field “Y2 (column 2)”.

9.4.7 Y-distance of Wells

If the pipetting operation specifies the use of more than one tip, Freedom EVOware adjusts the spacing between the tips in the Y direction to allow pipetting to take place on several wells simultaneously if possible. The tips are spread by a servo motor on the LiHa and the spacing is subject to physical limitations. The minimum spacing between adjacent tips is 9 mm and the maximum spacing is 38 mm, as shown by the light green area in the middle of the indicator. Freedom EVOware calculates the Y-distance (the spacing between adjacent wells) from the labware coordinates and the number of wells you have specified. This is shown by a vertical line which is colored either dark green or dark red. To optimize pipetting speed, the vertical line should lie within the green area. If the vertical line lies within the red area, you may have specified the coordinates incorrectly or inaccurately. Alternatively, you are using labware with a non-standard design.

The yellow line shows half of the minimum Y-distance (i.e. 4.5 mm). If you are using microplates with 384 wells and choose this Y-distance, pipetting can take place simultaneously to every other well.

9.4.8 Labware Attributes

The following table describes the standard attributes (parameters) in the Freedom EVOware database which are available for labware. All attributes are automatically configured with appropriate values when Freedom EVOware is installed. You only need to change the settings for special applications. Labware attributes should only be changed by specialists.

Tab. 9-20 *Labware attributes*

Field name	Default value	Description
Lid is allowed	0 (not allowed)	1 = a lid is allowed on this labware type. 0 = a lid is not allowed on this labware type. Read-only field - please set this attribute with the *Labware can have lid* checkbox in the advanced labware settings.
Location to store lid	<OBJECT>	Read-only field - Freedom EVOware writes the current location of the lid to this field when the script or process is running.
Lid grip offset narrow	0,0,0	Offset (in cm) from the taught position for gripping the lid of this labware type on the narrow side. a) b)
Lid grip offset wide	0,0,0	Offset (in cm) from the taught position for gripping the lid of this labware type on the wide side. a) b)
Plate grip offset narrow	0,0,0	Offset (in cm) from the taught position for gripping this labware type on the narrow side. a) b)
Plate grip offset wide	0,0,0	Offset (in cm) from the taught position for gripping this labware type on the wide side. a) b)
Force to grip plate	75	Specify the force to use when gripping plates (range: 0 to 249). A Grip Error message will be output if no resistance is detected when gripping.
Force to grip lid	60	Specify the force to use when gripping lids (range: 0 to 249). A Grip Error message will be output if no resistance is detected when gripping.

a) This allows the RoMa positions which have been taught to be shared by different labware types.
b) RoMa offset in the X, Y and Z direction (see 9.4.8.2 "RoMa Coordinate System", 9-39).

Other lid attributes can be set in the carrier definition. Broadly speaking, the lid attributes in the labware definition specify how to grip the lid; the lid attributes in the carrier definition specify where to store the lid if it is removed.

Labware attributes can also be used as variables in pipetting scripts (see 14.1.11 "Labware Attributes and String Variables", 14-16).

The Attributes dialog box for the Edit Labware dialog box normally shows descriptive names for the attributes. Check the *Show internal names* checkbox to see the internal names which are used.

Click *Add* to activate a **special attribute** for the labware and add it to the *Attributes* list. Special attributes are used to control advanced features in Freedom EVOware which normally dormant (inactive).

Check the *Show hidden attributes* checkbox to see additional, **hidden attributes** which should not normally be changed. They only need to be edited for special applications:

Tab. 9-21 *Labware attributes, hidden*

Field name	Default value	Description
Monitoring (obsolete)	1 (shown)	This field is no longer used.
Locking (obsolete)	1	This field is no longer used.
Lid arrival (Plus only)	0,0,1	Movement of the RoMa arm (in cm) to remove the lid. The default moves the arm up by 1 cm. [a)]
Lid grip narrow	8.5	The spacing (in cm) between the RoMa grippers which should be used to grip the lid on the narrow side. To ensure a firm grip, the grippers will try to close by an additional 1 cm (this is limited by the specified grip force).
Lid grip wide	12.5	The spacing (in cm) between the RoMa grippers which should be used to grip the lid on the wide side. To ensure a firm grip, the grippers will try to close by an additional 1 cm (this is limited by the specified grip force).
Lid offset	0,0,0.8	Distance (in cm) from the bottom of the labware to the bottom edge of the lid. [a)]
Lid position	0,0,0	Read-only field - Freedom EVOware writes the current position of the lid within the lid location to this field when the script or process is running.
Barcode (Plus only)		Scanned barcode data is written to this field. It contains <none> if the barcode was not yet scanned; it contains a default barcode if the scanner was unable to read the barcode See Default Barcode in 8.5.1.1, 8-40.
Labware type (obsolete)	0	Labware type (for automatic positioning of the labware on the worktable): 1 = Source 2 = Pre-dilution 4 = Destination 32 = DiTi This field is no longer used.
Well count	96	Number of wells in the labware

Tab. 9-21 *Labware attributes, hidden (cont.)*

Field name	Default value	Description
Plate type	1	Read-only field - please set this attribute with the *Washer plate type* field in the advanced labware settings. This variable is used by the Columbus Washer. It overwrites the plate type specified with the Columbus WashPlate device command.
File (obsolete)	<NONE>	This field is no longer used.
Source barcode (Plus only)		Barcode ID of the mother plate
Base location		Read-only field - Freedom EVOware writes the home location of the labware to this field when the labware is created.
Base position	1,1,1	Read-only field - Freedom EVOware writes the labware position within the base location to this field when the labware is created.
Finger type (obsolete)		This field is no longer used.
Location		Read-only field - Freedom EVOware writes the current location of the labware to this field when the script or process is running.
Position	1,1,1	Read-only field - Freedom EVOware writes the current position of the labware within the current location to this field when the script or process is running.
Grip narrow	8.5	The spacing (in cm) between the RoMa grippers which should be used to grip the labware on the narrow side. To ensure a firm grip, the grippers will try to close by an additional 1 cm (this is limited by the specified grip force).
Grip wide	12.5	The spacing (in cm) between the RoMa grippers which should be used to grip the labware on the wide side. To ensure a firm grip, the grippers will try to close by an additional 1 cm (this is limited by the specified grip force).
Offset between stacked plates (obsolete)	0,0,1	For stacked plates, distance from the bottom of the plate to the bottom of the next plate above [a)]. This field is no longer used.
Stacker type	1	Read-only field - please set this attribute with the *Stacker plate type* field in the advanced labware settings.

Tab. 9-21 Labware attributes, hidden (cont.)

Field name	Default value	Description
Grip delta	0.5	Distance which is added to the grip distance when releasing the labware or lid. Example: If Grip_Narrow is 8.5 cm and Grip_delta is 0.5 cm, the grippers will open to 9 cm to release the labware.
StripCount, StripMask		See 17.5 “Columbus Washer - Washing a Variable Number of Strips in the Plate”, 17-15.
BCZoffset	450	Offset in device steps to adjust the vertical position of the barcode scanner. This setting is related to the distance between the barcode label and the bottom edge of the labware.
Run_Parallel (Plus only)	1	Specifies the locking mode of the labware: 0 = If several process iterations want to use the same instance of this labware type, only one of them can run at the same time. The other processes (if any) must wait until the first process has finished. For example, this avoids a second process trying to pipette while the first process is still incubating the same labware. 1 = Labware is never locked; several process iterations can use the same instance of this labware type simultaneously. This is the default setting if the attribute Run_Parallel has not been defined. See also 9.11, 9-77.

a) RoMa offset in the X, Y and Z direction (see 9.4.8.2 “RoMa Coordinate System”, 9-39).

Table legend: “Plus only” - only relevant for Freedom EVOware Plus.

9.4.8.1 Attributes for MCA384 labware

The following attributes are only relevant for labware which is used by the MCA384 (Multi Channel Arm with 96 or 384 tips):

Tab. 9-22 *Attributes for MCA384 labware*

Field name	Default value	Description
RelMovesAllowed	-	Only for MCA384 head adapters: 0 = The head adapter can pick up all of the DITIs but not one row or one column. 1 = The head adapter can pick up one row or one column of DITIs in addition to picking up all of the DITIs. This requires a special head adapter (e.g. “Combo”) and a relative movement of the pipetting head.
DropOffset	-	This attribute is no longer used and should be set to “0”.
TipOffset	0,0,0	Only for MCA384 head adapters for DITIs: Offset of the tips (in 0.1 mm) compared to the head adapter for fixed tips. For example, with the “MCA Adapter 384 DITIs” the tips are displaced by 0.8 mm in the Y direction (0,8,0). With the “MCA Adapter 96 DITIs” the tips are displaced by -3.7 mm in the Y direction (0,-37,0).
YShift	-145	Only for MCA384 head adapters: The pipetting head movement which is required in the Y direction to pick up or put down the head adapter. It is dependent on the gear ratio of the bayonet locking mechanism and is normally -145.
PlateHardwareID	-	Only for MCA384 head adapters: Head adapter ID. All head adapter types have an ID (magnetic bit pattern from 1 to 15) to allow automatic identification by the pipetting head. It is used to check that the correct head adapter has been mounted.
MCA384Absolute PlungerPosition	-	Only for MCA384 DITI racks: The height of the MCA384 DITI racks depends on the type. This parameter specifies the plunger height which is required to mount the DITIs. Specify 27000 for 50 µl and 125 µl DITIs. Specify 8500 for 15 µl DITIs.

9.4.8.2 RoMa Coordinate System

The plate robot (RoMa) has it's own coordinate system which rotates with the RoMa:

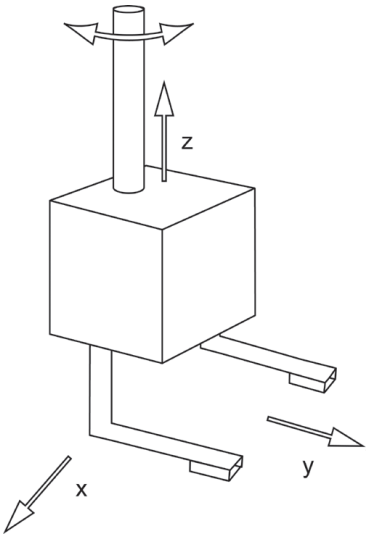


Fig. 9-14 *RoMa coordinate system*

The Y axis is aligned with the current direction of the gripper fingers. The X axis is perpendicular to the current direction of the gripper fingers.

In the dialog box for the Move RoMa command, RoMa coordinate "x" is labelled "A" and "y" is labelled "B" to avoid confusion with the worktable coordinates X, Y and Z.

9.5 Configuring Carriers

A carrier is a removable support on the instrument's worktable (i.e. deck) which holds one or more pieces of labware in place. Carriers can be fitted to the instrument's worktable at pre-defined grid positions (see Fig. 9-1, 9-3).

In Freedom EVOware, carriers are also used to represent positions on devices which can be accessed by the plate or tube robot. For example, the plate robot can put a microplate onto the shuttle of the Te-Stack stacker when the shuttle is at the transfer position.

The carrier name indicates the labware type for which it is desiged (for device carriers, it indicates the device type).

Note: *The Freedom EVOware database already contains a large selection of pre-defined carrier and labware types. You only need to create or edit carriers or labware if you cannot find a standard item which is suitable for your needs.*

The following dialog box is used to configure carriers (to get to this dialog box, double-click on the carrier in the Labware section of the Control Bar):

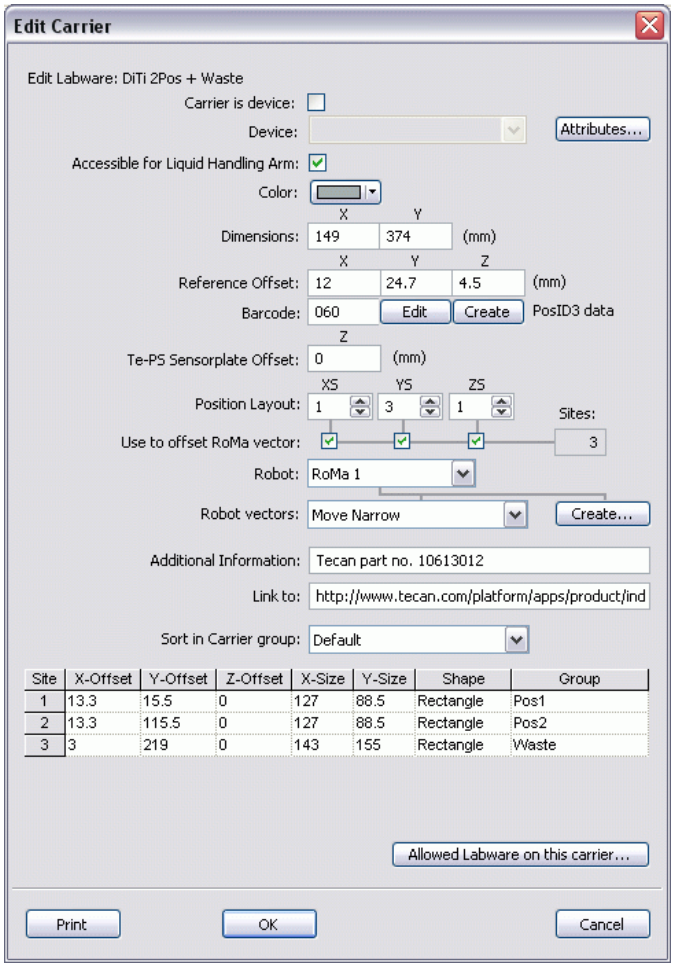


Fig. 9-15 *Edit Carrier dialog box*

It is recommended not to change the properties of the predefined carrier and labware types. Make a copy of the object with a new name if you want to alter any of the properties (see 5.4.1.12 “Context Menu for Objects in the Control Bar”, 5-14).

The parameters in the Edit Carrier dialog box are as follows:

Carrier is device

Check this checkbox and choose the device type (e.g. “Carousel”) from the *Device* pull-down list if the carrier you are configuring represents a device. The device will then appear as an icon in the Worktable Editor, around the edge of the pipetting area (the gray area). Do not check *Carrier is device* if the carrier is not a device.

For devices which are available in several versions (e.g. Te-Shake Shaker), *Carrier is device* must only be checked for the device version which you are actually using. By default, *Carrier is device* is only checked for Te-Shake 2Pos. If instead you are using e.g. Te-Shake 1Pos Front, uncheck this checkbox for Te-Shake 2Pos, check it for Te-Shake 1Pos Front and then choose *Shaker* from the *Device* pull-down list. Tip: The assigned device type is shown in the device icon in the Worktable Editor.

Use the Duplicate Device tool to create copies of the device driver if you want to use more than one Te-Shake Shaker (either the same or different versions). See A.9.3 “Duplicate Device Tool”, A-36.

Note: *If you click on a device icon in the Worktable Editor, an orange line shows the worktable grid position which is occupied by the device. By default, devices are configured for grid position 1, at the left edge of the worktable. Right-click the device icon, choose Set Grid and choose the actual grid position. This is not strictly necessary for devices which are rigidly attached to the pipetting instrument (you must check and/or teach the RoMa movement vectors in this case). For devices which are clipped to the locating pins of the worktable, the supplied RoMa vectors will only work correctly if the actual grid position is set correctly.*

Attributes

See 9.5.5 “Carrier Attributes”, 9-47 for information on carrier attributes.

Accessible for liquid handling arm

Check this checkbox if the carrier can be accessed by the LiHa for pipetting. This allows you to put the carrier on the pipetting area of the worktable (by dragging it from the Control Bar to the gray area in the Worktable Editor).

Uncheck this checkbox if the carrier can only be accessed by a plate or tube robot. This is the case with most devices. Devices are normally positioned on the worktable to the rear of the pipetting area or at the left or right side (some devices such as the centrifuge are mounted below a cutout in the worktable).

Three exceptions are the Te-Shake shaker (the LiHa can pipette onto labware on the shaker), the Te-MO (the LiHa can pipette onto labware on Te-MO slides) and the Te-Stack stacker (the LiHa can pipette onto labware which is placed on the shuttle at the Te-Stack transfer position).

Color

Choose a unique color to make it easier for you to identify this carrier type in the Worktable Editor. The default color for carriers is gray.

Dimensions

Specify the X and Y dimensions of the carrier outline in millimeters. See 9.5.1 “Carrier Dimensions and X/Y Offsets”, 9-45.

Reference offset

The X reference offset is the distance in millimeters between the left edge of the carrier and the closest positioning pin on the worktable below the carrier. The Y reference offset is the distance in millimeters between the rear edge of the carrier and the closest positioning pin on the worktable below the carrier.

The Z reference offset is the vertical distance in millimeters between the top surface of the worktable and the bottom edge of the labware on the carrier. See 9.5.1 “Carrier Dimensions and X/Y Offsets”, 9-45 and 9.5.2 “Z Offsets for Carriers”, 9-46.

Barcode

Specify the carrier code for the carrier. This is the first three digits of the barcode at the end of the carrier. All standard Tecan carriers have a unique carrier code. Only use barcode numbers in the range 500 to 999 for custom carriers.

If the PosID cannot scan the carrier or labware on the carrier due to a special carrier design, please set the Barcode field to “000”.

You cannot specify a barcode for a Robot only carrier (see the *Accessible for liquid handling arm* checkbox, above). The Barcode field is inactive (gray) in this case. Carriers which are devices do not have barcodes. Specify “000” if the Barcode field is active (not gray).

Carrier barcodes are not applicable to the Te-MO. The Barcode field should be left blank or specified as “000” in this case.

Edit and Create buttons: If your pipetting instrument is fitted with a PosID-3 barcode scanner, for some carrier types you will see Edit and Create buttons next to the Barcode field. These buttons are used to edit and create advanced barcode properties and barcode position information for the carrier. The Freedom EVOware database already contains advanced barcode properties for most common carrier types.

This configuration feature is only intended for specialists. Please contact Tecan for further information.

Te-PS Sensor Plate Offset (Z)

Standard carriers for microplates normally have a raised plateau which fits into a recess in the bottom of the plate (Te-PS carriers do not have a raised plateau and the Te-PS Sensor plate has a flat bottom without a recess). Accordingly, the Te-PS Sensor plate sits higher on a standard carrier than a microplate. If the carrier has a raised plateau, specify its height with this parameter (range: 0 to 10 mm). This parameter is only used if you place a Te-PS Sensor plate on a standard carrier for the purpose of arm alignment.

Position layout

Specify the number of positions (sites) which are available for labware in the X, Y and Z directions. The product X * Y * Z is the total number of sites (the maximum number of labware items that the carrier can accommodate). The total number of sites must not exceed 396.

The position layout for the 3-position microplate carrier is X=1, Y=3, Z=1 (total of 3 sites). The RoMa can access all 3 sites by moving in the Y direction.

The position layout for a common type of incubator is X=1, Y=1, Z=6 (total of 6 sites). The RoMa can access all 6 sites by moving in the Z direction.

The Te-MO 3x5 has 5 sites on each of 3 slides (X=3, Y=5, Z=1). To allow the RoMa to access all 15 sites, the slides move automatically to position the required site at the RoMa transfer position.

If you are configuring the carousel carrier, see also 9.5.5.3 “Carousel Carrier Attributes”, 9-50 and 9.5.5.4 “Carousel NT Carrier Attributes”, 9-52.

Use to offset RoMa vector

Check the checkboxes to indicate how many unique sites the device or carrier has for the RoMa to access. The total number of RoMa sites is shown in the Sites field. The checkboxes determine the directions in which the RoMa needs to move to access the sites (X, Y and/or Z).

For most carrier types, you should check all three checkboxes (X, Y and Z).

Special cases:

A common type of carousel has 9 towers and 21 microplates per tower (X=1, Y=9, Z=21, 189 labware items) but only one site for the RoMa to access (the carousel transfer position). In this case, you should only check the X column.

A single Te-Stack has 1 or 2 towers and 50 microplates per tower (X=1 or 2, Y=1, Z=50) but only one site for the RoMa to access (the Te-Stack transfer position). In this case, you should only check the Y column.

A double Te-Stack has 4 towers, 50 microplates per tower and two sites (transfer positions) for the RoMa to access (X=2, Y=2, Z=50). The RoMa can access both transfer positions by moving in the Y direction, so you should only check the Y column (total of 2 RoMa sites).

Use the Te-Stack Right carrier if the Te-Stack is mounted on the right side of the worktable; use the Te-Stack Left carrier if the Te-Stack is mounted on the left side of the worktable:

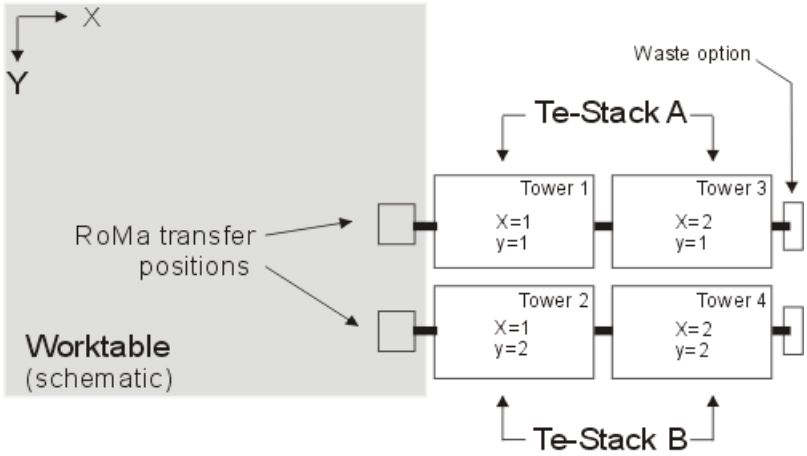


Fig. 9-16 *Double Te-Stack Right (with the default tower configuration)*

The Te-Stack X and Y coordinates are not the same as the worktable grid coordinates. See also 8.5.28.3 “Te-Stack and Te-Stack Te-MO Configuration - Towers Tab”, 8-98.

Robot

The pipetting instrument uses robots to pick up and put down labware on carriers. Movement commands for robots are called “robot vectors”. If you want to create or edit a robot vector for this carrier, you must first choose the robot you want to use (RoMa, MCA96 or CGM for the MCA384).

If your pipetting instrument is fitted with two plate robots (RoMa 1 and RoMa 2), you should create a vector for both plate robots for all carriers which can be accessed by both robots. Tip: the home position for plate robot 1 is at the rear left of the instrument.

Robot vectors

Choose the required robot vector type from the list and click Create (the button changes to Edit if the robot vector has already been created). .

See 9.6.1 “Using RoMa Vectors”, 🗎 9-58 for information on robot vector types.

Additional information

This field is for information purposes only and allows you to enter some notes about this carrier type. When you first install Freedom EVOware, this field shows the Tecan part number of the carrier.

Link to

This field is for information purposes only and is intended for the internet address (website URL) of the carrier manufacturer.

Sort in Carrier group

The Carriers tab in the Control Bar is subdivided into groups for Devices, Hotels, Microplate Carriers, DITI Carriers, Wash Stations, Trough Carriers, Tube Carriers (tube racks) and Miscellaneous Carriers. Choose the group where you want this carrier to be shown in the Control Bar. Choose Default to use the default Control Bar group for this carrier.

Table of sites and offsets

The table is used to configure dimensions for the sites and offsets. All dimensions are in millimeters.

X-Offset, Y-Offset

The X offset for sites is the distance between the left edge of the carrier and the left edge of the labware at the respective site. The Y offset for sites is the distance between the rear edge of the carrier and the rear edge of the labware at the respective site. See Fig. 9-17, 🗎 9-46.

Z-Offset

The Z offset for sites is normally “0” and is only specified non-zero if the sites on the carrier are not at the same height. You can specify either negative or positive values in this case. See Fig. 9-18, 🗎 9-46.

X-Size, Y-Size

X-Size and Y-Size are the outline dimensions of the site. See Fig. 9-17, 🗎 9-46.

Shape

Shape must always be *Rectangle*.

Groups

For carriers or devices with more than one site, if the sites have different mechanical characteristics you can specify labels (names) in the groups column to group equivalent sites into a single Freedom EVOware location. Freedom EVOware Plus automatically chooses which site it will use from the group when optimizing the schedule.

For example, the three towers of the Te-Stack Te-MO can only put plates on the front two sites of the respective Te-MO slide. For mechanical reasons, the sites at the rear of the Te-MO are not accessible to the stacker. In this case, assign the front two sites of each Te-MO slide to a separate group. For example, assign the group labels “Stack1” to sites 4 and 5, “StackM” to sites 9

and 10 and “Stack2” to sites 14 and 15 (see Tab. 8-9 “Te-MO 3x5 site numbers”, 8-104). Choose descriptive labels with no space characters. See also *EVOware location* in 8.5.28.4 “Te-Stack and Te-Stack Te-MO Configuration - Locations Tab”, 8-102.

A group is also needed for the Te-MO if you are using Active Positioning Carriers (APCs) but you have not fitted them to all sites. Assign the group label “APC” to the APC sites and put the labware onto one of the APC sites. if Freedom EVOware decides to use another Te-MO site or slide for pipetting, it will only use the APC sites.

The location groups you have created will be shown in dialog boxes which allow you to choose locations. The group name you have chosen is shown appended to the end of the carrier name, e.g. Te-MO_3x5_Stack1.

You can also use a label in the Groups column to identify a single site.

For example, you can assign a group label (e.g. “DITI-Waste”) to the waste site of a DITI carrier if you want Freedom EVOware Plus to use it for discarding racks with used DITIs. You must then specify this site for MoveLocation2 in the respective RoMa_ReplaceObject command (see 9.10.3.1 “Editing Custom Pre-actions and Post-actions”, 9-74, “Usage Example”). If you don’t specify a specific waste site, Freedom EVOware Plus will return DITI racks with used DITIs to their base (labware source) location, e.g. the carousel.

If you want to use group labels, you must assign labels to all sites of the carrier, not just one site. See e.g. Tab. 8-11 “Te-MO 3x5 group labels”, 8-104. For more examples, refer to *Group labels for carrier sites* in the index.

The Groups function is not relevant for Freedom EVOware Standard.

Allowed Labware on this carrier

For each of the labware types which can be used with this labware carrier or device carrier, check the checkboxes alongside the allowed sites.

9.5.1 Carrier Dimensions and X/Y Offsets

The figure below shows how to define the various dimensions for a carrier. The example is for the standard Tecan carrier *Microplate, 3 Pos., landscape*. The carrier type which is shown has a nose which extends beyond the rear edge. The positioning pins (shown in grey) are clipped to the worktable and are partially hidden from view by the carrier.

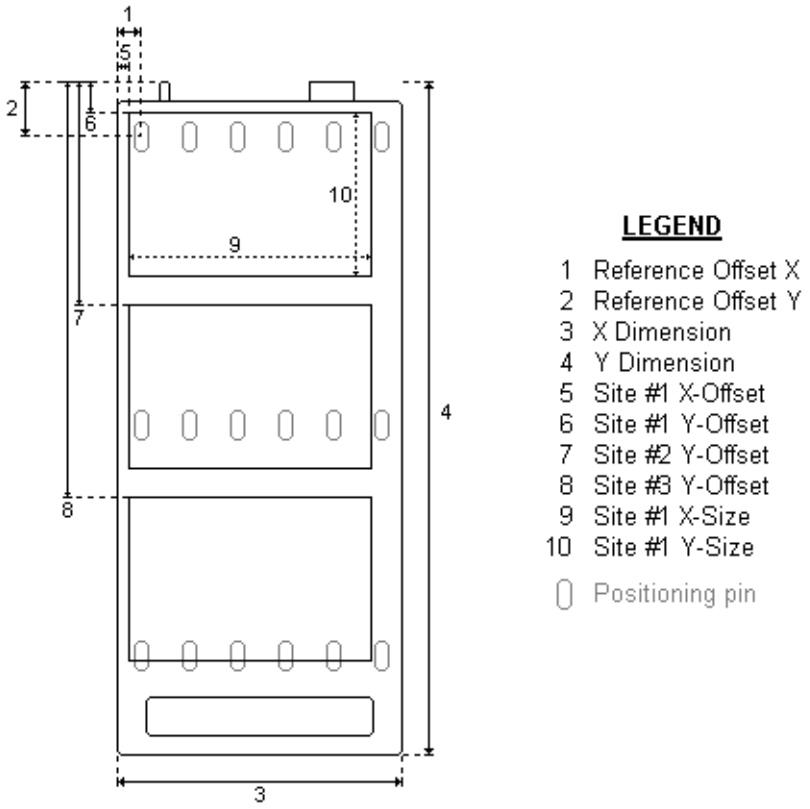


Fig. 9-17 *Carrier dimensions and X/Y offsets*

9.5.2 Z Offsets for Carriers

The figure below shows how to specify the reference offset Z (the vertical distance in millimeters between the top surface of the worktable and the bottom edge of the labware on the carrier). It does not refer to the top edge of the labware:

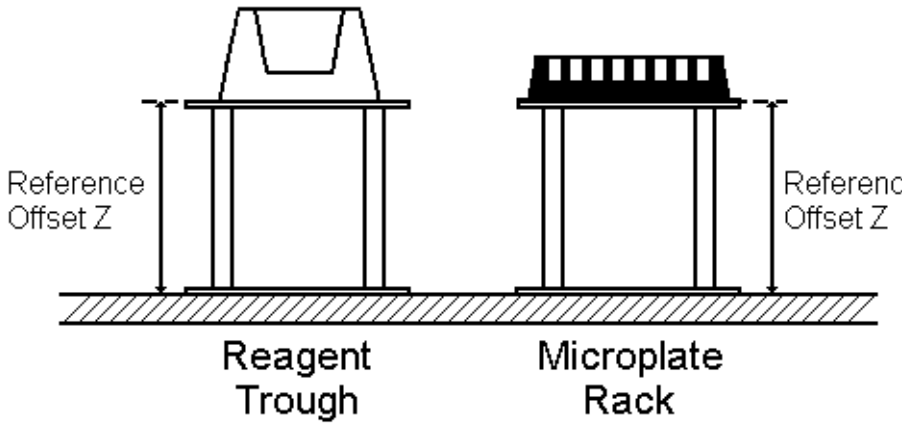


Fig. 9-18 *Specifying the Z offset for carriers*

9.5.3 Custom Objects

Proceed as follows if you want to define a custom object which is neither a carrier nor labware (i.e. it cannot be disassembled into a carrier and one or more pieces of labware). Define it as a new carrier and only specify X and Y dimensions for the carrier and X-Size and Y-Size for the site. Then define a new labware item, assign it to the site, specify the grid position and measure its coordinates as described in 9.4.4 “Teaching the Labware Coordinates”, 9-26. After saving the configuration you can use the custom object on the worktable anywhere where it is required.

9.5.4 Teaching the MCA384 System Carrier with DITI Racks

The DITI rack for 15 µl MCA384 DITIs is not as high as the DITI racks for 50 and 125 µl DITIs. The height difference is normally compensated by putting a 19 mm spacer block onto one or more sites of the MCA384 system carrier. Accordingly, when you specify dimensions for the MCA384 system carrier, you must increase the Z-offset of the site or sites to be used for the 15ul DITI rack by 19 mm. To do this, add 19 to the Z-offset value shown in the table of sites and offsets in the Edit Carrier dialog box.

If required, you can make a duplicate of the standard MCA384 system carrier using a new name and configure the copy with a modified Z-offset on one or more sites. This allows you to set up the worktable with several system carriers for a different combination of DITI sizes.

9.5.5 Carrier Attributes

The following tables describe the standard attributes (parameters) in the Freedom EVOware database which are available for carriers (including carriers which are devices). All attributes are automatically configured with appropriate values when Freedom EVOware is installed. You only need to change the settings for special applications. Carrier attributes should only be changed by specialists.

Carriers which are devices normally require you to specify the server name, as follows (the example is for the centrifuge):

Tab. 9-23 *Carrier attributes, centrifuge*

Field name	Default value	Description
Server	Centrifuge	Specify the call name for the device (the internal name of the device driver).

Most of the carriers require you to specify Grip orientation, Lid is allowed, Location to store lid and Allowed robots. These attributes are described in 9.5.5.1 “Labware Carrier Attributes”, 9-49. To save space, these descriptions are not repeated for each of the available carrier types.

The Attributes dialog box for the Edit Carrier dialog box normally shows descriptive names for the attributes. Check the *Show internal names* checkbox to see the internal names which are used.

Click *Add* to activate a special attribute for the carrier and add it to the *Attributes* list. Special attributes are used to control advanced features in Freedom EVOware which normally dormant (inactive).

Check the *Show hidden attributes* checkbox to see additional attributes which should not normally be changed. They only need to be edited for special applications.

Custom grip position

Some special carrier types and device carriers (e.g. readers) may require you to grip the labware at a non-standard grip height or grip position, for example to avoid a collision with adjacent mechanical components. The non-standard grip position is specified with the special carrier attributes Maximum grip offset and Minimum grip offset:

Tab. 9-24 *Carrier attributes, custom grip position for labware*

Field name	Default value	Description
Maximum grip offset	0,0,0	Maximum position (in cm) for gripping labware for use on this carrier. [a)]
Minimum grip offset	0,0,0	Minimum position (in cm) for gripping labware for use on this carrier. [a)]

a) RoMa offset in the X, Y and Z direction (see 9.4.8.2 “RoMa Coordinate System”, 🗎 9-39).

See 8.5.23.2 “Plate Robot Configuration - Settings Tab”, 🗎 8-86, Custom grip position, for more information.
If the above two attributes are not visible in the Attributes list, click *Add* to activate them (the internal names are Grasp_Location_max and Grasp_Location_min).

Note: *The labware attributes Plate Grip Offset Narrow and Plate Grip Offset Wide adjust the grip position globally globally for this labware type (not just for a specific carrier).*

9.5.5.1 Labware Carrier Attributes

The attributes which you can configure for labware carriers are as follows:

Tab. 9-25 *Labware carrier attributes*

Field name	Default value	Description
Grip orientation	narrow (narrow side)	This field specifies whether the RoMa should grip labware on this carrier on the narrow side or wide side. If you specify “narrow”, make sure that you have created a “Move Narrow” RoMa vector for this carrier (vice versa for “wide”) [a].
Lid is allowed	no (not allowed)	Specify “yes” if a lid is allowed on labware which is on this carrier.
Location to store lid	<base> (original position of labware)	If lids are not allowed on labware which is on this carrier, the lid will be removed from the labware and moved to the location specified in this field. [b]
Allowed robots		Comma separated list of all plate robots that can safely access this location (e.g. “RoMa, RoMa2”). The robot names are case sensitive. If this field is left empty, Freedom EVOware assumes that all plate robots can safely access this location. The list may be necessary if e.g. the carrier is positioned at the extreme left or extreme right of the worktable.
SafeMoveOffset	0	X-offset in mm for safe LiHa movement to and from the pipetting position (see 17.4 “Safe Pathways Feature”, 17-14).
SafeMoveSpeed		Speed to use for movements along safe paths in mm/s (see 17.4 “Safe Pathways Feature”, 17-14).
Safety	1	Only for the MCA384 DITI Carrier: 1 = Close the locking mechanism when mounting DITIs from the MCA384 DITI Carrier. 0 = Do not close the locking mechanism.
ZTravel	-	Only if you choose *Positioning with advanced Z-travel* in the Configuration Tool (see 8.4.2.11, 8-34). If the ZTravel parameter is non-zero, it is used for Z-travel height instead of the taught Z-travel height.

a) If you specify “narrow” and the physical orientation of the carrier site is landscape (e.g. the “MP 3 Pos” carrier), the RoMa will grip the labware from the side of the worktable (with the grippers pointing in the direction X or -X), not from the front (vice versa for “wide”).

b) Broadly speaking, the lid attributes in the labware definition specify how to grip the lid; the lid attributes in the carrier definition specify where to store the lid if it is removed.

Other lid attributes can be set in the labware definition. Broadly speaking, the lid attributes in the labware definition specify how to grip the lid; the lid attributes in the carrier definition specify where to store the lid if it is removed.
Check the *Show hidden attributes* checkbox to see additional, **hidden attributes** which should not normally be changed. They only need to be edited for special applications:

Tab. 9-26 *Labware carrier attributes, hidden*

Field name	Default value	Description
Lid_position	0,0,0	Specify the required position of the lid within the lid location. [a)]
Dimension	-	Read-only field - please set this attribute with the *Position Layout* pull-down lists in the Edit Carrier dialog box.
Occupation	0	For internal use only.
Speed	-	Allowed maximum speed of RoMa movement in % of full RoMa speed when moving to this location.
Dimension_mask	1,1,1	Read-only field - please set this attribute with the *Use to offset RoMa vector* checkboxes in the Edit Carrier dialog box. [a)]

a) X, Y and Z RoMa movements in cm (see 9.4.8.2 "RoMa Coordinate System", 9-39).

9.5.5.2 Barcode Scanner Carrier Attributes

The additional attributes which you can configure for the barcode scanner carrier are as follows:

Tab. 9-27 *Carrier attributes, barcode scanner*

Field name	Default value	Description
Server	BarcodeScanner	Specify the call name for the device (the internal name of the device driver).
Device requires release of labware	no	With most devices such as the Te-Shake shaker, the RoMa puts the labware onto the device. The barcode scanner is an on-the-fly device - the RoMa presents the labware to the scanner but does not release it. Specify "no" in this field for on-the-fly devices.

See 9.5.5.1 "Labware Carrier Attributes", 9-49 for descriptions of the other attributes.

9.5.5.3 Carousel Carrier Attributes

The additional attributes which you can configure for the Carousel carrier are as follows:

Tab. 9-28 *Carrier attributes, Carousel*

Field name	Default value	Description
Slot pitch height	1925	Specify the vertical distance in device steps between the bottoms of adjacent labware items in the same tower. This information is required by the carousel feeder mechanism. The slot pitch height also determines how many labware items will fit in the carousel tower. If you change this setting, you may need to correct the YS setting in the position layout for the carousel carrier (see 9.5 “Configuring Carriers”, 9-39).
Starting cartridge in carousel	1	The carousel must be subdivided into several logical carousels (separate sets of towers) if you want to use it to store a mixture of labware types with different dimensions. To create logical carousels, make copies of the carousel carrier (right-click the carrier in the Control Bar and choose Duplicate) and specify the starting tower, the slot pitch height, the Y dimensions (number of towers) and a new name for each copy. [a)] The settings for starting tower and number of towers must not overlap the settings of other logical carousels for this device. You should not put labware with different dimensions in the same tower.
Server	Carousel	Specify the call name for the device (the internal name of the device driver).
Transfer height	5000	Specify the height of the handler (shuttle) in device steps when it is positioned at the carousel transfer position.

a) You must restart Freedom EVOware after creating the logical carousel(s).

See 9.5.5.1 “Labware Carrier Attributes”, 9-49 for descriptions of the other attributes.

9.5.5.4 Carousel NT Carrier Attributes

The additional attributes which you can configure for the Carousel NT carrier are as follows:

Tab. 9-29 *Carrier attributes, Carousel NT*

Field name	Default value	Description
Starting cartridge in carousel	1	The carousel must be subdivided into several logical carousels (separate sets of towers) if you want to use it to store a mixture of labware types with different dimensions. To create logical carousels, make copies of the carousel carrier (right-click the carrier in the Control Bar and choose Duplicate) and specify the starting tower, the slot pitch height, the Y dimensions (number of towers) and a new name for each copy. [a] The settings for starting tower and number of towers must not overlap the settings of other logical carousels for this device. You should not put labware with different dimensions in the same tower. For the Carousel NT, slot pitch height is configured in the driver (see 8.5.3.2 “Carousel NT Configuration - Hotel - Cartridge Configuration Tab”, 8-46).
BCZOffset	450	Offset in device steps to adjust the vertical position of the barcode scanner. This setting is related to the distance between the barcode label and the bottom edge of the labware.
Server	CarouselNT	Specify the call name for the device (the internal name of the device driver).

a) You must restart Freedom EVOware after creating the logical carousel(s).

See 9.5.5.1 “Labware Carrier Attributes”, 9-49 for descriptions of the other attributes.

9.5.5.5 Centrifuge Carrier Attributes

The additional attributes which you can configure for the centrifuge carrier are as follows:

Tab. 9-30 *Carrier attributes, centrifuge*

Field name	Default value	Description
Server	Centrifuge	Specify the call name for the device (the internal name of the device driver).

See 9.5.5.1 “Labware Carrier Attributes”, 9-49 for descriptions of the other attributes.

9.5.5.6 Incubator Carrier Attributes

See 8.5.8 “Settings for Heated Incubators 1 to 3”, 8-55 for information on logical incubators.

9.5.5.7 Pooling Balance Carrier Attributes

The additional attributes which you can configure for the Mettler pooling balance are as follows:

Tab. 9-31 *Carrier attributes, Mettler pooling balance*

Field name	Default value	Description
Carrier is a pooling balance	No	Choose *Yes* if the balance is a pooling balance. See 10.1.1 “Global Parameters for Liquid Classes”, 10-4, Liquid Arrival Check for more information.
Enforce tip-wise dispensing	No	The Liquid Arrival Check feature normally verifies that the correct liquid volumes have been dispensed by weighing the labware after pipetting from all of the tips which are selected in the pipetting command. If a volume discrepancy is detected, it is not possible to identify which tip has pipetted inaccurately. Choose *Yes* if you want to verify the pipetted volume for each tip separately. The pipetting operation will take significantly longer in this case.

See 9.5.5.1 “Labware Carrier Attributes”, 9-49 for descriptions of the other attributes.

For more information on the pooling balance, see Liquid Arrival Check in 10.1.1 “Global Parameters for Liquid Classes”, 10-4.

9.5.5.8 Te-Shake Carrier Attributes

The additional attributes which you can configure for the Te-Shake carrier are as follows:

Tab. 9-32 *Carrier attributes, Te-Shake*

Field name	Default value	Description
Server	Shaker	Specify the call name for the device (the internal name of the device driver).
DeviceIDs [a)]	7	Hardware address of the shaker plus 1. Read-only field - please set this attribute with the Settings tab of the Te-Shake driver in the Configuration Tool.
Has heater [a)]	0	Specify 1 if the shaker is fitted with the heater option.
Init temperature [a)]	0	If the shaker is fitted with the heater option, specify the initial temperature.

a) Hidden attribute. Click the Show hidden attributes checkbox to make it visible.

See 9.5.5.1 “Labware Carrier Attributes”, 🗎 9-49 for descriptions of the other attributes.
See also 16.28 “Commands for the Te-Shake Shaker”, 🗎 16-90 for more information on the Te-Shake carrier.

9.5.5.9 Te-Stack Carrier Attributes

The additional attributes which you can configure for the Te-Stack carrier are as follows:

Tab. 9-33 *Carrier attributes, Te-Stack*

Field name	Default value	Description
Allowed robots		Comma separated list of all plate robots that can safely access this location (e.g. “RoMa, RoMa2”). The robot names are case sensitive. If this field is left empty, Freedom EVOware assumes that all plate robots can safely access this location.
PlateStacker	1	Always specify 1 to indicate that this is a last-in first-out stacking device (if a microplate is removed from the stacker, all of the other ones will slide down one position).
Server	Te-Stacker	Specify the call name for the device (the internal name of the device driver).
WasteLocation		0 = Do not use the Te-Stack Waste option. 1 = Use the Te-Stack Waste option. Labware returned to the Te-Stack will then be discarded to the Te-Stack Waste. The Te-Stack Waste hardware option is mainly intended for discarding empty DITI racks. WasteLocation is a hidden attribute.

See 9.5.5.1 “Labware Carrier Attributes”, 🗎 9-49 for descriptions of the other attributes.
See also 16.34 “Commands for the Te-Stack”, 🗎 16-107 for information on logical Te-Stack devices.

9.5.5.10 Te-Stack Te-MO Carrier Attributes

The additional attributes which you can configure for the Te-Stack Te-MO carrier are as follows:

Tab. 9-34 *Carrier attributes, Te-Stack Te-MO*

Field name	Default value	Description
Allowed robots	Te-StackTeMO	Always specify Te-StackTeMO.
PlateStacker	1	Always specify 1 to indicate that this is a last-in first-out stacking device (if a microplate is removed from the stacker, all of the other ones will slide down one position).
Server	Te-StackTeMO	Specify the call name for the device (the internal name of the device driver).

See 9.5.5.1 “Labware Carrier Attributes”, 9-49 for descriptions of the other attributes.

9.6 Creating and Editing Plate Robot Vectors

The plate robot (RoMa, robot manipulator) is a robot arm with gripper fingers that can grip and move objects within the working area of the pipetting instrument. It can be used to transport microplates, reagent blocks, deep well plates, etc. between carriers, incubators and storage positions (e.g. a RoMa shelf or carousel). Current Tecan pipetting instruments can be fitted with up to two RoMas.

RoMa actions such as getting a microplate from a RoMa hotel or putting it onto a carrier are stored in the Freedom EVOware configuration. Each RoMa action is called a RoMa vector, which is a predefined sequence of RoMa positions (called waypoints). RoMa vectors are associated with carriers.

Movement vectors for the MCA96 gripper and the CGM of the MCA384 are very similar in principle to RoMa vectors, so they will not be described explicitly in this chapter. See 9.8 “Creating and Editing MCA Vectors”, 9-69 for additional information on these vector types.

In Freedom EVOware Standard, RoMa actions are specified by adding RoMa commands to your pipetting script. The RoMa Vector and Transfer Labware commands specify the RoMa vector you want to execute (see 15.58 “RoMa Vector Command”, 15-141, 15.59 “Transfer Labware Command”, 15-143 and 15.57 “Move RoMa Command”, 15-140).

In Freedom EVOware Plus, RoMa movements are carried out automatically when the process is run. Freedom EVOware Plus automatically chooses the carriers and sites which will be used for pipetting to maximize the throughout (efficiency) of the process. It then chooses the RoMa vectors which are needed to move the labware to and from these sites. You only need to make sure that the appropriate RoMa vectors are available for the carrier types you want to use.

RoMa vectors can have up to 7 waypoints, but must have at least two. The first waypoint is called the safe position and the last waypoint is called the end position.

- The **safe position** is where the RoMa starts its movement towards the site to pick up or to release the object (e.g. the microplate). It should be chosen such

that the RoMa can move to the safe position of another RoMa vector or to the RoMa home position without colliding with other objects on the worktable.

- The **end position** is where the RoMa grips or releases the object.

Each RoMa vector is associated with a carrier. If the carrier is moved on the worktable, the RoMa vector moves along with it and does not need to be redefined. Accordingly, you only have to define a RoMa vector once for each carrier type, and you can then use it for any worktable position of this carrier type.

In addition, Freedom EVOware automatically recalculates the RoMa vector for each site of the carrier (it gets information on the spacing between the sites from the carrier definition). So you only need to define a RoMa vector for one of the sites (typically the first site).

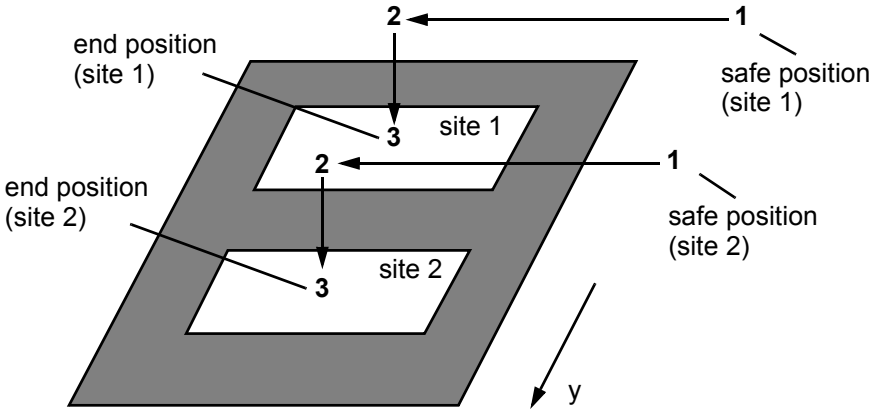


Fig. 9-19 *Two site carrier showing two RoMa movements with three waypoints each*

The above figure shows two RoMa vectors for a two site carrier. In the example, each Roma vector has three waypoints (1, 2 and 3). Freedom EVOware automatically calculates the RoMa vector for site 2 from the RoMa vector for site 1.

Up to four RoMa vectors can be created for each carrier type:

- Approach Narrow
- Move Narrow
- Approach Wide
- Move Wide

See 9.6.1 “Using RoMa Vectors”, 🗎 9-58 for more information on these vectors. They are associated with carriers and are stored in the carrier definition (see 9.6.2 “Teach Plate Robot Vector Dialog Box”, 🗎 9-59).

You also need to create a RoMa vector which moves the RoMa back to the home (parking) position, out of the way of other objects on the worktable (you need to define two home vectors if your instrument is fitted with two RoMas). See 9.6.4 “Defining the Home Position for a RoMa”, 🗎 9-62.

When Freedom EVOware moves an object from one position to another, it typically needs to carry out two RoMa vectors. The first one moves the RoMa from its current position to the safe position of site 1 and then to the end position of site 1, grips the plate and moves back to the safe position again using the same vector in reverse. It then moves directly to the safe position of site 2. Using the second

RoMa vector it moves to the end position of site 2, releases the plate and moves back to the safe position again. Depending on the configuration, in Freedom EVOware Plus the RoMa then either waits at this position or moves back to its home (parking) position out of the way of other objects on the worktable. In Freedom EVOware Standard, you should use the Move RoMa command to move the RoMa back to its home position after carrying out a sequence of RoMa movements.

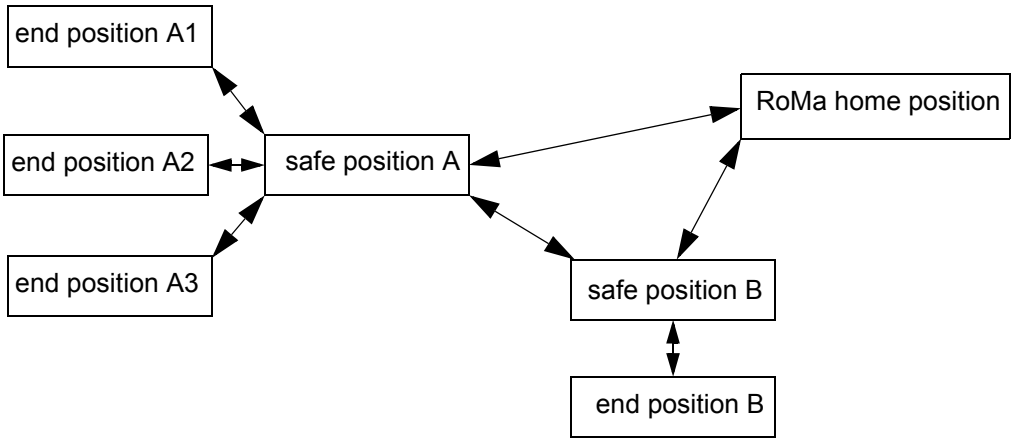


Fig. 9-20 *Moving labware from carrier A to carrier B*

The above figure shows how the RoMa moves labware between three sites of carrier A and one site of carrier B.

When the RoMa transfers a plate from carrier A to carrier B, it first moves from its current position (not shown in the figure) to the safe position of carrier A, then it moves to the end position of the required site, grips the plate and moves back to the safe position of carrier A again. From this position it moves directly to the safe position of carrier B, moves to its end position, releases the plate and moves back to the safe position of carrier B. Depending on the configuration of the RoMa, the RoMa either waits at this position or moves back to its home (parking) position. See 9.6.4 “Defining the Home Position for a RoMa”, 9-62.

Note: *The safe positions of the RoMa vectors and the RoMa home position should all be chosen such that the RoMa can move between them without colliding with other objects on the worktable. Also keep in mind that the RoMa needs to rotate if the two sites have a different orientation (landscape or portrait) and that it needs to move without obstruction both with and without a microplate.*

A so-called “teach plate” is available from Tecan as an aid when teaching the positions of the labware. The teach plate can be can be mounted on the RoMa grippers and ensures that the labware is always gripped in the same way.

RoMa vectors can be assigned to regular carriers such as microplate carriers which are used by the liquid handling arm for pipetting operations. They can also be assigned to so-called *Robot only* carriers, which are typically storage devices such as carousels and hotels or other devices such as shakers and incubators. Robot only carriers can be accessed by plate or tube robots but are not used for pipetting operations. See the *Accessible for liquid handling arm* checkbox in 9.5 “Configuring Carriers”, 9-39.

9.6.1 Using RoMa Vectors

Movement commands for the robot arms (RoMa, MCA96 gripper and the CGM of the MCA384) are called vectors. You can create them in the Edit Carrier dialog box, in which case they are associated with a specific carrier and are stored in the carrier definition. You can also create “user-defined” vectors. This is done on the Robot Vectors tab of the Control Bar. User-defined vectors are intended e.g. for the Vector command of the respective robot arm.

Movement vectors for the MCA96 gripper and the CGM are very similar in principle to RoMa vectors, so they will not be described explicitly in this chapter. See 9.8 “Creating and Editing MCA Vectors”, 9-69 for additional information on these vector types.

Freedom EVOware Standard

In Freedom EVOware Standard, RoMa vectors are executed using the script commands RoMa Vector and Transfer Labware. Simple RoMa movements are executed with the Move RoMa command, which does not need a vector.

Freedom EVOware Plus

In Freedom EVOware Plus, RoMa vectors are mainly used as pre-actions and post-actions of device commands. The pre-actions and post-actions are executed automatically when the process step is executed. If your process involves pipetting to a plate which is initially stored in a carousel, Freedom EVOware first uses the robot vector associated with the carousel to take the plate from the carousel and then uses the robot vector associated with the carrier to put the plate on the carrier. You do not need to specify the RoMa vectors - Freedom EVOware gets them from the carrier and device definitions. You only need to make sure that the RoMa vectors which you want to use are already set up in the Freedom EVOware configuration.

Note: *An example of a special application which requires you to specify RoMa vectors explicitly is working with insert plates. The sequence of movements which is required to access a certain part of the plate depends on the laboratory process which you want to implement.*

Up to four RoMa vectors can be created for each carrier type:

- Approach Narrow: Vector for picking up plates on the narrow side. The end position of this vector is chosen to be a short distance away from the final position (a few cm).
- Move Narrow: Vector for picking up plates on the narrow side. It moves from the current position of the robot to the final position where the object is gripped.
- Approach Wide: Vector for picking up plates on the wide side. The end position of this vector is chosen to be a short distance away from the final position (a few cm).
- Move Wide: Vector for picking up plates on the wide side. It moves from the current position of the robot to the final position where the object is gripped.

It is normally only necessary to specify the Move vectors and not the Approach vectors. For example, the microplate carrier “MP 3Pos” normally only needs a Move Narrow vector. Although the labware is put on this carrier in landscape orientation, the RoMa is instructed to grip the labware on the narrow side and not from the front (see 9.5.5.1 “Labware Carrier Attributes”, 9-49).

The two Approach vectors can be optionally defined for intelligent devices such as the carousel, and are used together with the Move vectors to optimize the throughput. The carousel may take 20 seconds or so to get a plate out of the specified tower. To save time, the Approach vector can be started while the carousel is still getting the plate.

If you request a plate from a carousel, Freedom EVOware proceeds as follows:

- A RoMa Approach vector instructs the RoMa to move towards the carousel and stop a few cm away.
- A Carousel LoadPlate command instructs the carousel to take the plate from the tower and move it to the exchange position, where it can be accessed by the RoMa.
- To save time, the RoMa Approach movement and the carousel movement take place simultaneously.
- As soon as the carousel has reached the exchange position, a RoMa Move vector instructs the RoMa to move to the exchange position, where it grips the plate and returns with the plate to it's safe position.

If the RoMa Approach vector is not specified, only the RoMa Move vector is used. In this case, throughput optimization is not carried out.

9.6.2 Teach Plate Robot Vector Dialog Box

The following dialog box is used to create and edit plate robot (RoMa) vectors. See 9.6 "Creating and Editing Plate Robot Vectors", 9-55 for more information on plate robot vectors.

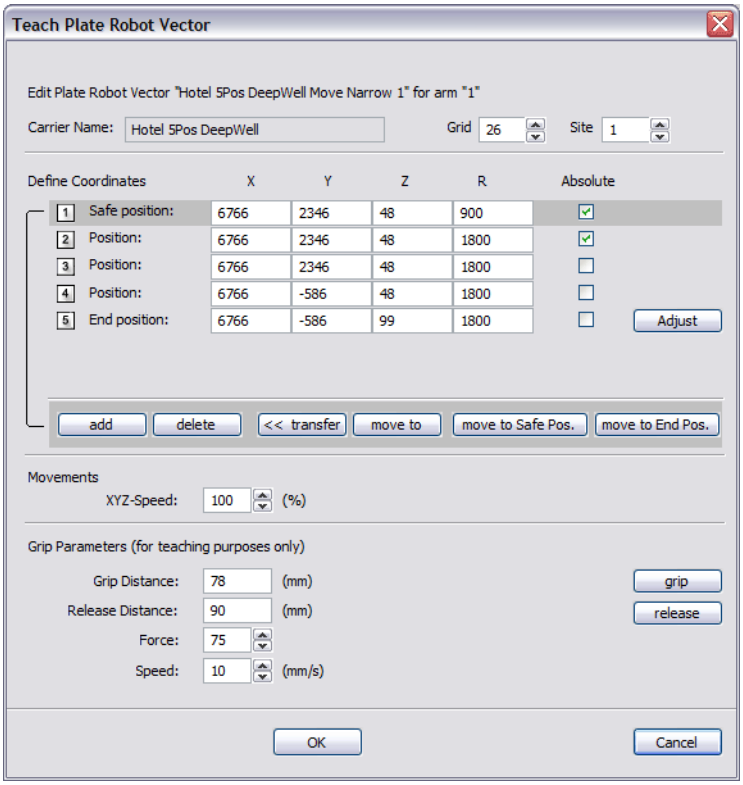


Fig. 9-21 *Teach Plate Robot Vector dialog box*

To get to this dialog box, open the Edit Carrier dialog box for the carrier you want to use, choose the plate robot you want to use (1 or 2), choose a robot vector from the list and click Create. The button changes to Edit if the respective robot vector has already been created.

You are then prompted to click on the carrier site which you want to use for teaching. You can only click on a carrier of the correct type. Since you will need to

carefully observe the plate robot movements, you should choose a site which has good visibility.

The parameters in the Teach Plate Robot Vector dialog box are as follows:

Carrier name

Name of the carrier for which the RoMa vector is being defined.

Grid, Site

These fields show the grid position and the site which you chose for teaching.

The adjustment buttons of the Site field are protected (gray) if the carrier only has one site.

ATTENTION

Risk of the RoMa moving to the wrong position on the worktable.

- Please choose the correct grid position and site before specifying any coordinates or using any of the movement buttons. Otherwise the RoMa might move to the wrong position on the worktable.

Define Coordinates panel

This shows the RoMa positions (waypoints) which will be used for the RoMa vector. Each waypoint is specified by its X, Y and Z coordinates in instrument steps (0.1 mm) and a value for the rotation of the gripper arms (R, measured in 0.1° steps).

Absolute

Check this checkbox to use absolute positions for the selected waypoint. In this case, when Freedom EVOware automatically recalculates the RoMa vector for each site of the carrier it only changes the X coordinates. This may be necessary if the RoMa could otherwise collide with other objects on the worktable. See 9.6.3 “Absolute Positions in RoMa Vectors”, 9-61. The Absolute checkbox should not be checked for the End position.

The following buttons can be used to edit, insert and delete waypoints and to move the RoMa along the specified waypoints:

add pos.

This button inserts a new entry in the waypoint list above the currently selected entry.

delete

This button deletes the currently selected entry in the waypoint list.

transfer

This button copies the current RoMa position (as shown in the Plate Robot tab of the Move dialog box) to the selected entry in the waypoint list. Do this when you want to teach the current position of the RoMa.

Note: *You can move the RoMa using the keys on the numeric keypad (see the Move dialog box and 9.3.2 “Moving the RoMa (Plate Robot)”, 9-5).*

move to...

This button moves the RoMa to the coordinates of the selected entry in the waypoint list. The Plate Robot tab of the Move dialog box will be updated accordingly.

move to Safe Position

This button moves the RoMa along the defined waypoints from the selected waypoint to the safe position of the RoMa vector (the first waypoint).

move to End Position

This button moves the RoMa along the defined waypoints from the selected waypoint to the end position of the RoMa vector (the last waypoint).

Adjust button

The *Adjust* button is only available if the carrier is not accessible to the liquid handling arm (example: microplate hotel). It is used to adjust the carrier definition for a specified, single site to compensate for small manufacturing inaccuracies in a multi-site carrier without needing to switch to the Edit Carrier dialog box. To use this feature, choose the site you want to adjust and click *Move to End Position* to move the RoMa to the final position of the RoMa vector. Then fine tune the RoMa position using the numeric keypad and click the *Adjust* button to modify the carrier definition to match the current X, Y and Z coordinates. After saving your changes, they will also be visible in the Edit Carrier dialog box (the units in the *Move* dialog box are in 0.1 mm; the units in the Edit Carrier dialog box are in mm).

Movements panel

XYZ Speed

Specify the required speed for x, y and z movements.

Grip Parameters panel

Grip Distance

This is the distance in mm that the RoMa gripper closes to when gripping an object with this vector (range: 55 to 140 mm). It should be about 1 to 2 mm less than the width of the object.

Release Distance

This is the distance in mm that the RoMa gripper opens to when releasing an object with this vector (range: 55 to 140 mm). It should be about 3 to 4 mm more than the width of the object.

Force

This is the force that the gripper uses when gripping an object. The force is specified by a number between 0 and 249. Higher numbers mean higher force.

Speed

This is the speed in mm/s with which the gripper tries to grip an object.

grip

Click this button to close the gripper to the specified gripping distance for testing purposes. The gripper remains at the specified gripping distance until the Release button is clicked.

release

Click this button to open the gripper to the specified release distance for testing purposes.

9.6.3 Absolute Positions in RoMa Vectors

One or more waypoints in a RoMa vector can be configured as absolute positions. For such waypoints, when Freedom EVOware automatically calculates the RoMa

vector for each site of the carrier it only changes the X coordinates. You can test this by checking the Absolute checkbox in the Edit Plate Robot Vector dialog box and changing the specified site.

You may need to specify one or more absolute waypoints in your RoMa vector if the RoMa could otherwise collide with other objects on the worktable. The Abs. checkbox should not be checked for the End position.

In the following figure, waypoint 1 is an absolute waypoint (compare this figure with Fig. 9-19, 9-56).

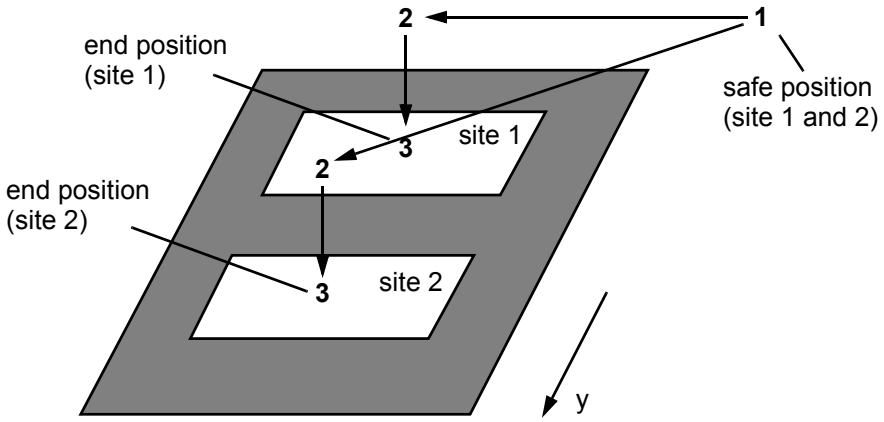


Fig. 9-22 *Two RoMa vectors with three waypoints each. Waypoint 1 is an absolute waypoint - it is used by both RoMa vectors*

The above figure shows two RoMa Vectors for a two site a carrier; the Absolute checkbox has been checked for waypoint 1 (the safe position in this case). Accordingly, EVOware uses the same safe position for both sites. This may be necessary if the RoMa could otherwise collide with other objects on the worktable (not shown in the figure). When Freedom EVOware automatically calculates the RoMa vector for site 2 from the RoMa vector for site 1, it does not change the coordinates for waypoint 1.

9.6.4 Defining the Home Position for a RoMa

After completing a sequence of movements with the RoMa, it should be moved back to its home (i.e. parking) position, out of the way of other objects on the worktable. Otherwise it might obstruct the movement of other arms such as the LiHa.

The RoMa moves to the home position when you exit Freedom EVOware. In Freedom EVOware Standard, the RoMa moves to the home position if you specify *Move to home position* with the Move RoMa command. Freedom EVOware Plus moves the RoMa back to the home position automatically (see 8.5.23.2 “Plate Robot Configuration - Settings Tab”, 8-86).

The home position for a RoMa is normally at the extreme left or right of the worktable, and should be chosen to be out of the way of other objects on the worktable. The home position is specified by creating a special RoMa vector with the name “Home 1”, which moves the RoMa to the chosen safe position.

If your instrument is fitted with two RoMas, the home position for RoMa 1 is normally at the extreme left of the worktable and the home position for RoMa 2 is

normally at the extreme right of the worktable. The home position for RoMa 2 is specified by creating a special RoMa vector with the name “Home 2”.

Proceed as follows to define a home vector for the RoMa:

Identify a route across the worktable from right to left (for RoMa 1) or left to right (for RoMa 2) along which the RoMa can safely move without colliding with other objects. Then create a RoMa vector for this route with at least five waypoints, whereby the first waypoint of this vector (the safe position) is the required home position.

To edit an existing home vector, click Robot Vectors in the Control Bar, right-click on the vector and choose Edit. See 9.6.2 “Teach Plate Robot Vector Dialog Box”, 9-59 for further information.

To create a new home vector, click Robot Vectors in the Control Bar, right-click on the Robot Vectors group title and chose New. Name the vector “Home 1” (for RoMa 1) or “Home 2” (for RoMa 2). The new home vector will be shown in the Home Vectors group in the Control Bar (Robot Vectors section).

Freedom EVOware Standard

If you specify *Move to home position* with the Move RoMa command, during script runtime Freedom EVOware automatically determines the closest waypoint of the home vector to the current RoMa position. The RoMa then moves to this waypoint and along the home vector until the home position (the first waypoint) has been reached.

9.7 Creating and Editing Tube Robot Vectors

The tube robot (PnP; Pick & Place arm) is a robot arm with gripper fingers that can grip and move tubes within the working area of the pipetting instrument, for example to transport tubes between tube racks. Current Tecan pipetting instruments can be fitted with up to two PnP arms.

PnP actions such as getting a tube from a tube rack are stored in the Freedom EVOware configuration. Each PnP action is called a PnP vector, which is a predefined sequence of PnP positions (called waypoints). PnP vectors are associated with labware such as tube racks.

In both Freedom EVOware Standard and Freedom EVOware Plus, PnP movements are initiated by script commands (see 15.61 “PnP Vector Command”, 15-146, and 15.62 “Transfer Tube Command”, 15-148). Simple PnP movements are carried out with the Move PnP command, which does not need a PnP vector (see 15.60, 15-145).

In Freedom EVOware Plus, you first must use a special process step to open the script editor (see 16.25.1 “Tube Robot - ExecuteScript Command”, 16-83).

PnP vectors can have up to 7 waypoints, but must have at least two. The first waypoint is called the safe position and the last waypoint is called the end position.

- The **safe position** is where the PnP starts its movement towards the site to pick up or to release the tube. It should be chosen such that the PnP can move to the safe position of another PnP vector or to the PnP home position without colliding with other objects on the worktable.
- The **end position** is where the PnP grips or releases the tube.

Each PnP vector is associated with a labware item such as a tube rack. If the labware is moved on the worktable, the PnP vector moves along with it and does not need to be redefined. Accordingly, you only have to define a PnP vector once

for each labware type, and you can then use it for any worktable position of this labware type.
In addition, Freedom EVOware automatically recalculates the PnP vector for each well of the labware (it gets information on the spacing between the wells from the labware definition). So you only need to define a PnP vector for one of the wells (typically the first well). In your pipetting script, the position of a tube in the tube rack can be specified as a variable. This allows you to access all of the tubes in the tube rack using the same script command.

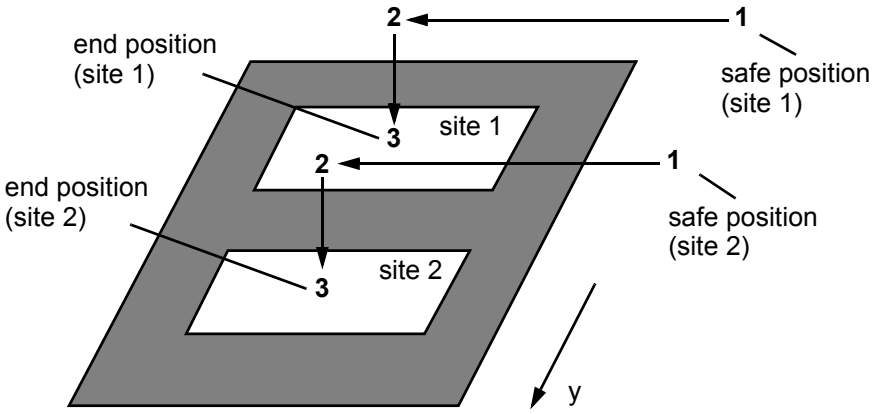


Fig. 9-23 *Two site carrier showing two PnP movements with three waypoints each*

The above figure shows two PnP vectors for a two site carrier. In the example, each PnP vector has three waypoints (1, 2 and 3). Freedom EVOware automatically calculates the PnP vector for site 2 from the PnP vector for site 1.

PnP vectors are associated with labware (typically tube racks) and are stored in the labware definition (see 9.7.2 “Teach Tube Robot Vector Dialog Box”, 🗎 9-65).
You also need to create a PnP vector which moves the PnP back to the home (parking) position, out of the way of other objects on the worktable (you need to create two home vectors if your instrument is fitted with two PnPs). See 9.7.4 “Defining the Home Position for a PnP”, 🗎 9-69.

When Freedom EVOware moves a tube from one tube rack to another, it typically needs to carry out two PnP vectors. The first one moves the PnP from its current position to the safe position of site 1 and then to the end position of site 1, grips the tube and moves back to the safe position again using the same vector in reverse. It then moves directly to the safe position of site 2. Using the second PnP vector it moves to the end position of site 2, releases the tube and moves back to the safe position again. Depending on the configuration, in Freedom EVOware Plus the PnP then either waits at this position or moves back to its home (parking) position out of the way of other objects on the worktable. In Freedom EVOware Standard, you should use the Move PnP command to move the PnP back to its home position after carrying out a sequence of PnP movements.

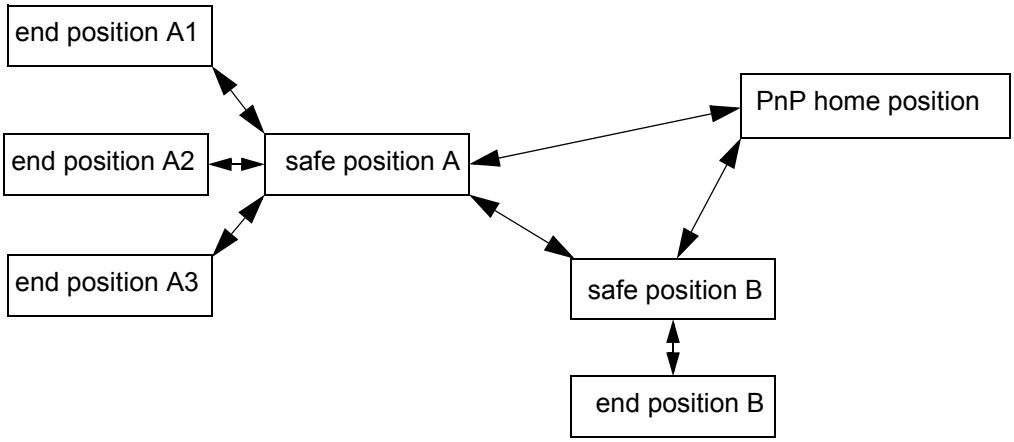


Fig. 9-24 *Moving labware from carrier A to carrier B*

The above figure shows how the PnP moves tubes between three sites of carrier A and one site of carrier B.

When the PnP transfers a tube from carrier A to carrier B, it first moves from its current position (not shown in the figure) to the safe position of carrier A, then it moves to the end position of the required site, grips the tube and moves back to the safe position of carrier A again. From this position it moves directly to the safe position of carrier B, moves to its end position, releases the tube and moves back to the safe position of carrier B. Depending on the configuration of the PnP, the PnP either waits at this position or moves back to its home (parking) position. See 9.7.4 “Defining the Home Position for a PnP”, 9-69.

Note: *The safe positions of the PnP vectors and the PnP home position should all be chosen such that the PnP can move between them without colliding with other objects on the worktable. Also keep in mind that the PnP needs to rotate if the two sites have a different orientation (landscape or portrait) and that it needs to move without obstruction both with and without a microplate.*

9.7.1 Using PnP Vectors

Movement commands for the tube robot (PnP vectors) are associated with labware such as tube racks. They are specified in the labware definition.

In both Freedom EVOware Standard and Freedom EVOware Plus, PnP vectors are executed using the script commands PnP Vector and Transfer Tube. Simple PnP movements are executed with the Move PnP command, which does not need a vector.

9.7.2 Teach Tube Robot Vector Dialog Box

The following dialog box is used to create and edit tube robot (PnP) vectors. See 9.7 “Creating and Editing Tube Robot Vectors”, 9-63 for more information on tube robot vectors.

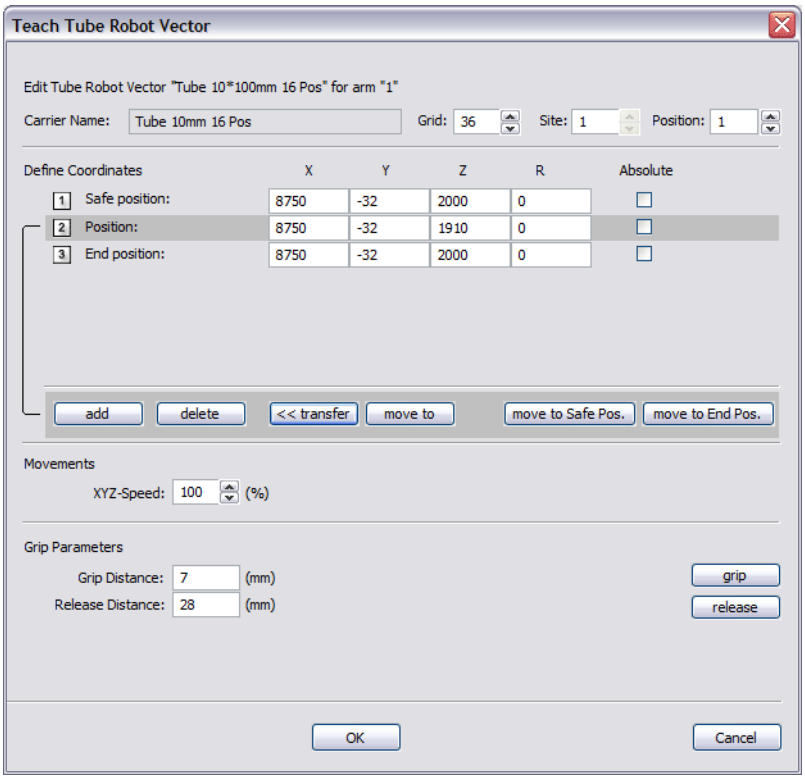


Fig. 9-25 *Teach Tube Robot Vector dialog box*

To get to this dialog box, open the Edit Labware dialog box for the tube rack you want to use and click the Create button (it is just above the Cancel button). The button changes to Edit if the robot vector has already been created.

You are then prompted to click on the carrier site which you want to use for teaching. Since you will need to carefully observe the tube robot movements, you should choose a site which has good visibility.

The parameters in the Teach Tube Robot Vector dialog box are as follows:

Carrier name

Name of the labware item for which the PnP vector is being defined.

Grid, Site

These fields show the grid position and the site which you chose for teaching the vector.

The adjustment buttons of the Site field are protected (gray) if the labware's carrier only has one site.

Position

Choose the position in the tube rack which you want to use for teaching (tube positions are counted from rear to front).

ATTENTION

Risk of the PnP moving to the wrong position on the worktable.

- Please choose the correct grid position and site before specifying any coordinates or using any of the movement buttons. Otherwise the PnP might move to the wrong position on the worktable.

Define Coordinates panel

This shows the PnP positions (waypoints) which will be used for the PnP vector. Each waypoint is specified by its X, Y and Z coordinates in instrument steps (0.1 mm) and a value for the rotation of the gripper fingers (R, measured in 0.1° steps).

Absolute

Check this checkbox to use absolute positions for the selected waypoint. In this case, when Freedom EVOware automatically recalculates the PnP vector for each site of the carrier it only changes the X coordinates. This may be necessary if the PnP could otherwise collide with other objects on the worktable. See 9.7.3 “Absolute Positions in PnP Vectors”, 9-68. The Absolute checkbox should not be checked for the End position.

The following buttons can be used to edit, insert and delete waypoints and to move the PnP along the specified waypoints:

add pos.

This button inserts a new entry in the waypoint list above the currently selected entry.

delete

This button deletes the currently selected entry in the waypoint list.

transfer

This button copies the current PnP position (as shown in the Tube Robot tab of the Move dialog box) to the selected entry in the waypoint list. Do this when you want to teach the current position of the PnP.

Note: *You can move the PnP using the keys on the numeric keypad (see the Move dialog box and 9.3.3 “Moving the PnP (Tube Robot)”, 9-6).*

move to...

This button moves the PnP to the coordinates of the selected entry in the waypoint list. The Tube Robot tab of the Move dialog box will be updated accordingly.

move to Safe Position

This button moves the PnP along the defined waypoints from the selected waypoint to the safe position of the PnP vector (the first waypoint).

move to End Position

This button moves the PnP along the defined waypoints from the selected waypoint to the end position of the PnP vector (the last waypoint).

Movements panel

XYZ Speed

Specify the required speed for x, y and z movements.

Grip Parameters panel

Grip Distance

This is the distance in mm that the PnP gripper closes to when gripping an object with this vector (range: 7 to 28 mm). It should be about 1 to 2 mm less than the width of the object.

Release Distance

This is the distance in mm that the PnP gripper opens to when releasing an object with this vector (range: 7 to 28 mm). It should be about 3 to 4 mm more than the width of the object.

grip

Click this button to close the gripper to the specified gripping distance for testing purposes. The gripper remains at the specified gripping distance until the Release button is clicked.

release

Click this button to open the gripper to the specified release distance for testing purposes.

9.7.3 Absolute Positions in PnP Vectors

One or more waypoints in a PnP vector can be configured as absolute positions. For such waypoints, when Freedom EVOware automatically calculates the PnP vector for each site of the carrier it only changes the X coordinates. You can test this by checking the Absolute checkbox in the Edit Tube Robot Vector dialog box and changing the specified site.

You may need to specify one or more absolute waypoints in your PnP vector if the PnP could otherwise collide with other objects on the worktable. The Abs. checkbox should not be checked for the End position.

In the following figure, waypoint 1 is an absolute waypoint (compare this figure with Fig. 9-23, 9-64).

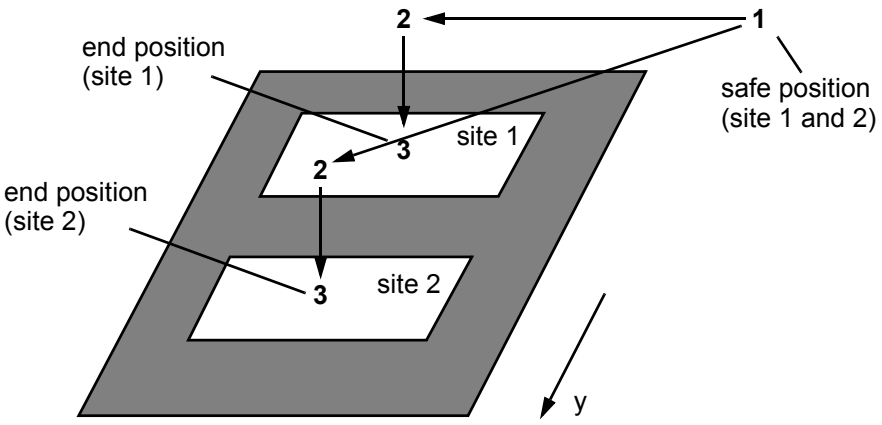


Fig. 9-26 *Two PnP vectors with three waypoints each. Waypoint 1 is an absolute waypoint - it is used by both PnP vectors*

The above figure shows two PnP Vectors for a two site a carrier; the Absolute checkbox has been checked for waypoint 1 (the safe position in this case). Accordingly, EVOware uses the same safe position for both sites. This may be necessary if the PnP could otherwise collide with other objects on the worktable (not shown in the figure). When Freedom EVOware automatically calculates the PnP vector for site 2 from the PnP vector for site 1, it does not change the coordinates for waypoint 1.

9.7.4 Defining the Home Position for a PnP

After completing a sequence of movements with the PnP, it should be moved back to its home (i.e. parking) position, out of the way of other objects on the worktable. Otherwise it might obstruct the movement of other arms such as the LiHa.

The PnP moves to the home position when you exit Freedom EVOware. In Freedom EVOware Standard, the PnP moves to the home position if you specify *Move to home position* with the Move PnP command. Freedom EVOware Plus moves the PnP back to the home position automatically.

The home position for a PnP is normally at the extreme left or right of the worktable, and should be chosen to be out of the way of other objects on the worktable. The home position is specified by creating a special PnP vector with the name “Home 1”, which moves the PnP to the chosen safe position.

If your instrument is fitted with two PnPs, the home position for PnP 1 is normally at the extreme left of the worktable and the home position for PnP 2 is normally at the extreme right of the worktable. The home position for PnP 2 is specified by creating a special PnP vector with the name “Home 2”.

Proceed as follows to define a home vector for the PnP:

Identify a route across the worktable from right to left (for PnP 1) or left to right (for PnP 2) along which the PnP can safely move without colliding with other objects. Then create a PnP vector for this route with at least five waypoints, whereby the first waypoint of this vector (the safe position) is the required home position.

To edit an existing home vector, click Robot Vectors in the Control Bar, right-click on the vector and choose Edit. See 9.7.2 “Teach Tube Robot Vector Dialog Box”, 9-65 for further information.

To create a new home vector, click Robot Vectors in the Control Bar, right-click on the Robot Vectors (Tubes) group title and chose New. Name the vector “Home 1” (for PnP 1) or “Home 2” (for PnP 2). The new home vector will be shown in the Home Vectors group in the Control Bar (Robot Vectors section).

Freedom EVOware Standard

If you specify *Move to home position* with the Move PnP command, during script runtime Freedom EVOware automatically determines the closest waypoint of the home vector to the current PnP position. The PnP then moves to this waypoint and along the home vector until the home position (the first waypoint) has been reached.

9.8 Creating and Editing MCA Vectors

Movement ectors for the MCA (Multi Channel Arm) are very similar in principle to RoMa vectors. The special features of MCA96 and MCA384 vectors are described below.

9.8.1 MCA96 Vectors

The MCA96 can be optionally fitted with gripper fingers to allow it to pick up and move labware. In contrast to the RoMa, the gripper fingers cannot be rotated (they are always parallel to the X axis of the pipetting instrument). Accordingly, you cannot specify the R axis for MCA vectors.

When setting up the hardware, the MCA96 gripper option can be attached to the MCA96 pipetting head on the left side with the gripper fingers pointing to the right (under the head) or on the right side with the gripper fingers pointing to the left

(under the head) or to the right (away from the head). On the left side and pointing to the left is not supported.

You cannot and do not need to define a home position for the MCA96.

Please see 9.6 “Creating and Editing Plate Robot Vectors”, 🗎 9-55 for more information on creating vectors.

9.8.2 MCA384 Vectors

The MCA384 can be optionally fitted with a gripper module (CGM, common gripper module) which can be used to pick up and move labware. The CGM can be rotated. The CGM can only be used for gripping and moving labware when it is undocked. Commands which use the CGM initiate the undocking operation automatically, if necessary. See also 15.69.13 “MCA384 Dock CGM Command”, 🗎 15-204 and 15.69.14 “MCA384 Undock CGM Command”, 🗎 15-204.

When you teach a CGM vector, Freedom EVOware also needs to know the Y position of the MCA384 pipetting head to ensure that the CGM will not collide with the MCA384 as it moves.

You cannot and do not need to define a home position for the MCA384.

Please see 9.6 “Creating and Editing Plate Robot Vectors”, 🗎 9-55 for general information on creating vectors.

9.9 Configuring Device Drivers

Device drivers are configured with Freedom EVOware’s Configuration Tool (see 8.5 “Device Driver Configuration”, 🗎 8-39). See 13.2 “Overview of Device Commands”, 🗎 13-12 for information on the device drivers which are provided with EVOware together with the icon which is shown in the Worktable Editor.

9.10 Local Settings for Process Steps (Context Menu)

In Freedom EVOware Plus, the following settings can be made in the Process Editor for each of the process steps. You can access the settings by right-clicking on the process step icon and choosing the required item from the context menu.

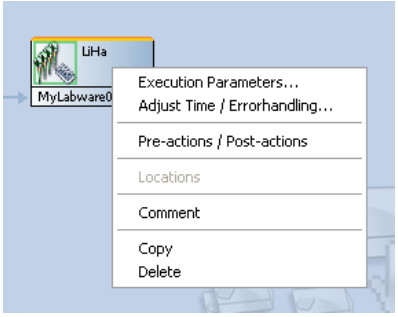


Fig. 9-27 *Context menu for a process step*

See 9.11 “Local Settings for Labware Source Icons (Context Menu)”, 9-77 for the settings you can make for labware source icons.

9.10.1 Execution Parameters

This option is used to edit the execution parameters for the current process step (i.e. device command). The settings only apply to the selected process step. You can also open the Edit Parameters dialog box by double-clicking on the process step. The available settings are described under “Execution Parameters” in the respective section for the device (see 16 “Device Commands”, 16-1).
In addition, the Edit Parameters dialog box is opened automatically when you add the command to the Process Editor.

Note: *The dialog box will not open if the respective device command does not have any execution parameters.*

9.10.2 Adjust Time/Error handling

This option is used to edit the command execution time and the reaction to errors. The settings only apply to the selected process step.

9.10.2.1 General Tab

This tab lets you specify the *execution time* and *waiting time* which should be used by the scheduler for this process step.

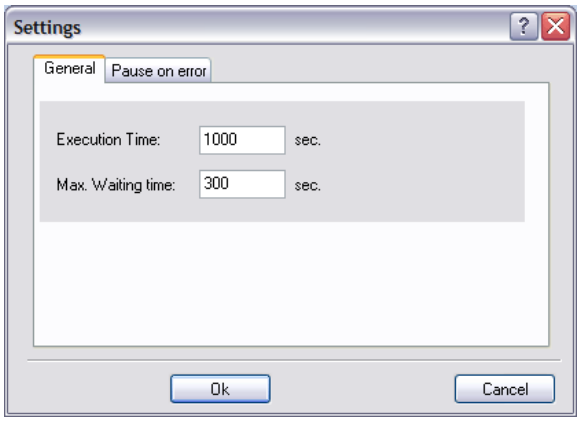


Fig. 9-28 *Configuring the execution time and max. waiting time for a command*

The parameters in this dialog box are as follows:

Execution Time

Specify the execution time in seconds that should be assigned to this process step. An error will be output during process runtime if the command is not completed within this time. When you insert the command into your process, this field initially shows the default execution time specified for the command with the Configuration Tool (see 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116).

Note: *With some device commands, the default execution time is automatically re-calculated when the command is inserted and a more accurate value is put into this field.*

Max. Waiting Time

Specify the maximum additional time in seconds the labware can wait before the next action has to be performed. This may be important e.g. if you have heated the samples to a specified temperature and they should not be allowed to cool down too much before the next process step.

Example - A pipetting command with an execution time of 500 s must be completed within 500 s or an error message will be generated. If you set *Max. Waiting Time* to 300 s, Freedom EVOware may leave the plate for an additional 300 s at the pipetting position or on the following device if this is advantageous for the scheduling.

Note: *Max. Waiting Time includes the time required to move the labware to the next device. Accordingly, it should always be larger than the time required for the associated RoMa_MoveObject command.*

9.10.2.2 Pause On Error Tab

This tab lets you specify which types of errors will trigger a system pause if they occur during execution of this process step.

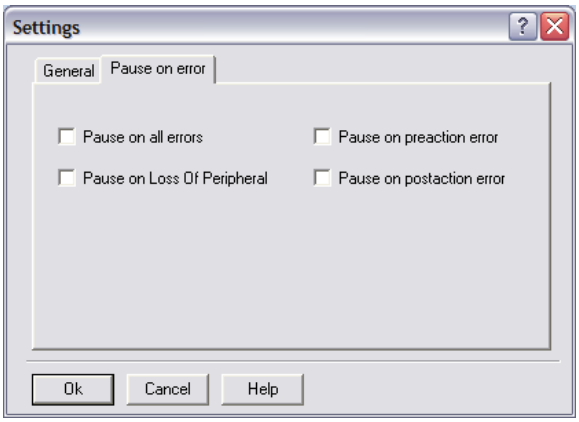


Fig. 9-29 *Configuring the reaction of the command to errors*

Check the corresponding boxes if you want the system to halt on all errors, on loss of peripheral errors, on errors in pre-actions and/or on errors in post-actions.

Note: *The settings made in the Error Handling tab section of the Freedom EVOware Configuration Tool can be configured to overwrite the local settings you make here. See* *8.4.4.3 “Pause On Error Tab”, 8-38* *for details.*

9.10.3 Pre-actions / Post-actions (Custom)

In some cases it is necessary to carry out additional actions before and after the command is executed. This done using pre-actions and/or post-actions – commands which are always carried out before and after the main command. For example, if you want to scan labware in a Tecan Ultra reader with the Measure command, it is necessary to open the reader door (with the Ultra_Open command) and to move the labware to the reader using the plate robot (with the

RoMa_MoveObject command). To make sure that the door is opened in time, the door must be opened before moving the labware. Another RoMa_MoveObject command and an Ultra_Close command are needed when the scanning operation is finished. The door must be closed after moving the labware.

The process diagram is simplified by implementing the additional actions as pre-actions and post-actions which are linked to the Measure command. EVOware then adds the pre-actions and post-actions to the Measure command automatically. This avoids having to specify these four additional steps for each Measure command manually.

The standard pre-actions and post-actions are specified in the command definition using the Configure Tool (see 8.5.35 “Driver Tab of the Configure Device Driver Properties Dialog Box”, 8-116).

Choose *Pre-actions & Post-actions* in the context menu to specify **custom pre-actions and post-actions**, which are used for special applications. The settings only apply to the currently selected process step.

In the *Custom Pre-actions / Post-actions* dialog box, the *Pre-actions* and *Post-actions* tabs Initially show the standard pre-actions and post-actions (if any):

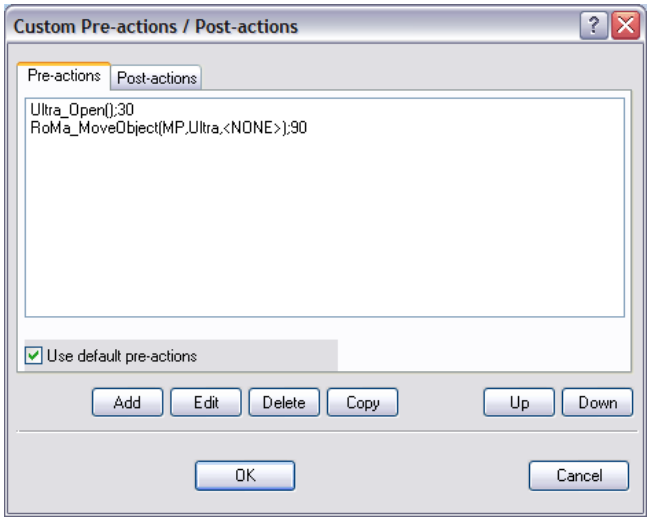


Fig. 9-30 *Configuring custom pre-actions and post-actions for the process step*

Uncheck *Use default pre*-actions and/or *Use default post*-actions if you want to specify additional pre-actions and/or post-actions or to modify existing ones.

Note: *If you create any custom pre-actions and post-actions, they will be deleted again if you check Use default pre-actions and/or Use default post-actions.*

Click *Delete* to delete the currently selected pre-action or post-action**.** Click *Copy* to copy the currently selected pre-action or post-action. The new pre-action or post-action will have the same settings as the one you copied.

Click the *Up* and *Down* buttons to change the sort order of the pre-actions and post-actions. This changes the sequence with which the pre-actions and post-actions are carried out. Taking the above example of the Measure command for the Ultra reader, the door must be opened before the plate robot brings the labware.

9.10.3.1 Editing Custom Pre-actions and Post-actions

To edit a pre-action or post-action, click the *Pre-actions* or the *Post-actions* tab, select the required entry and click *Edit* to display the *Edit Custom Pre-actions / Post-actions* dialog box.

To add a pre-action or post-action, click the *Pre Actions* or the *Post Actions* tab and click *Add* to display the *Edit Custom Pre-actions / Post-actions* dialog box.

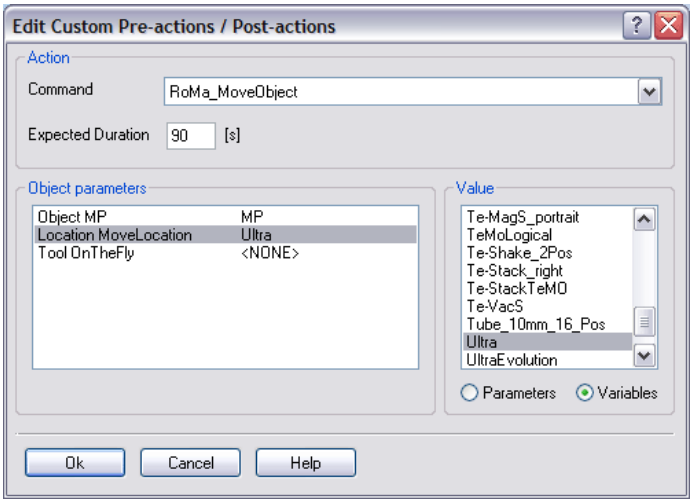


Fig. 9-31 *Editing custom pre-actions and post-actions*

In the *Edit Custom Pre-actions / Post-actions* dialog box, choose the command to be executed as a pre-action or post-action from the pull-down list and specify its default execution time in the *Expected Duration* field.

The *Object Parameters* panel lists the parameters which are needed by the selected command. Select an object parameter and choose the required value from the list in the *Value* panel. Click the Parameters radio button to show pre-defined constants. Click the Variables radio button to show defined instances of objects.

The Value panel shows the parameters and variables which can be chosen for the selected object parameter type, as follows:

Tab. 9-35 *Parameters and variables versus object parameter types*

Object parameter type	Placeholder	Variables
Object	<none> or MP	Labware site on the worktable
Location	<base> or <none>	Device or labware site
Tool	<base> or <none>	On-the-fly tool (e.g. barcode scanner)[a)]

a) This field is normally set to <NONE>. On-the-fly tools are normally specified in the Process Editor using drag and drop.

<base> is a placeholder which represents the original location of the object (the labware source). <none> is a placeholder to indicate that the parameter is unused.

Usage example

You can use a custom pre-action if you want Freedom EVOware Plus to use a specific location for discarding racks with used DITIs. If you don't specify a specific waste site, Freedom EVOware Plus will return racks with used DITIs to their base (labware source) location, e.g. the carousel. Proceed as follows:

- Configure the pipetting instrument to use DITIs and put a DITI carrier (e.g. DITI 2Pos + Waste) on the worktable. Then right-click on the carrier and choose Edit Carrier from the context menu.
- Assign a group label (e.g. "DITI-Waste") to the DITI waste site (site 3). See 9.5 "Configuring Carriers", 9-39, "Groups".
- Put DITI racks in the carousel using the labware generator. Add a LiHa Pipette process step to your process, put a DITI rack on the DITI carrier and add DITI commands to the pipetting script. Exit the Script Editor.
- Save the process.
- Right-click the LiHa Pipette process step, choose *Pre-actions / Post-actions* from the context menu and select the RoMa_ReplaceObject command. Click Edit, choose MoveLocation2, click *Variables* and choose the carrier site you have labeled from the pull-down list. The group name you have chosen is shown appended to the end of the carrier name, e.g. DiTi_2Pos_+_Waste_DITI-Waste. Confirm the dialog boxes with OK.

Pre-actions and post-actions are not relevant for Freedom EVOware Standard.

9.10.4 Locations

Process steps can have one or more object parameters, which are shown as "fields" in the bottom half of the icon. The object parameters show the names of the labware and/or devices which are involved in the operation.

The first object parameter is the name of the labware which is involved in the process step.

If the labware needs to be moved in the process step, the second object parameter specifies the required location of the labware when the process step has been completed. For example, the RoMa_MoveObject command requires you to specify where you want to move the labware item to. Right-click on the second object parameter, choose Locations and choose the required location, typically another device. Choose the placeholder <base> if you want the labware to be returned to the position it had at the beginning of the process (the labware source).

After choosing a location you will see a tick alongside the object parameter field and the object parameter field shows the specified location.

The third object parameter is used to specify an optional on-the-fly device, normally a barcode scanner. Right-click on the second object parameter, choose Locations and choose the required on-the-fly device. Choose the placeholder <none> if you do not want to use an on-the-fly device in this process step.

The following example shows the RoMa_MoveObject command before you have specified the labware, the location and the on-the-fly-device:

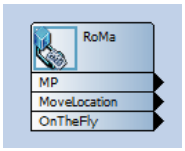


Fig. 9-32 *Specifying locations 1*

In the following example, the RoMa_MoveObject command has been configured to move the microplate MyLabware1 to the centrifuge but does not scan the barcode on the way:

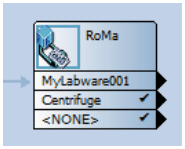


Fig. 9-33 *Specifying locations 2*

The above figure is shown as an example only. The RoMa_MoveObject command is normally only used for pre-actions and post-actions and is not normally used directly in the Process Editor.

9.10.5 Comment

Specify an optional comment (or label) for the process step:

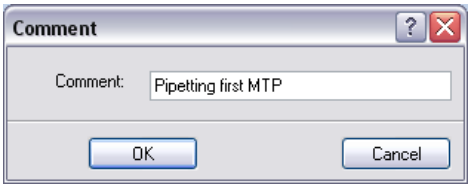


Fig. 9-34 *Comment for the process step*

When you run the process, the comments are shown in the Gantt chart of the Runtime Controller as tool tips (yellow labels which appear when you move the cursor above the horizontal colored bars). If you choose suitable comments, this can help you to identify different parts of the Gantt chart. See 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14.

9.10.6 Copy

This option is used to copy the selected process step.

9.10.7 Delete

This option is used to delete the selected process step.

9.11 Local Settings for Labware Source Icons (Context Menu)

In Freedom EVOware Plus, the following settings can be made in the Process Editor for each of the labware source icons. You can access these dialog boxes by right-clicking on the labware source icon and choosing the required item from the context menu.

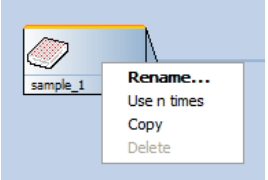


Fig. 9-35 *Context menu for labware source icons*

Rename

This option is used to enter a new name for the labware source. You can also rename the labware source by double-clicking on the labware source icon.

Use n times

Specify the required number of times if you want to reuse the labware in another process instance. A typical use of this feature is a serial dilution where you want to use different process instances to handle different columns of the same microplate. Another use is a trough or deep well microplate which contains a sufficient volume of liquid to be used several times. Take care with this feature if the settings in the Runtime Controller allow the process instances to run in parallel. You need to make sure that the labware will still be available for all of the instances when it is needed. See also Tab. 9-21 “Labware attributes, hidden”, 9-35, *Run Parallel* attribute.

Copy

Make a copy of the labware source. A typical use of this feature is a carousel which contains different plate types in different towers. For the first copy of the labware source, use the labware generator to take a set of plates from a specific tower. Then use the copy feature if you need the same plate type somewhere else in your process. This is faster to do than using the labware generator a second time.

Delete

Press Del or choose Delete to delete the labware source.

See 9.10 “Local Settings for Process Steps (Context Menu)”, 9-70 for the settings you can make for process steps for devices.

10 Configuring Liquid Classes

This chapter describes how to create and edit liquid classes for the liquids that you want to aspirate or dispense.

A liquid class is a collection of parameters necessary for pipetting liquids. Each liquid class is divided into subclasses for a certain hardware configuration and volume range. The subclasses are automatically selected at runtime depending on the used hardware and required volume.

The Freedom EVOware database already contains a large selection of pre-defined liquid classes.You only need to create or edit a liquid class if you cannot find a standard liquid class which is suitable for your needs. See 10.7 “Overview of Liquid Classes Supplied With Freedom EVOware”, 10-42.

10.1 Liquid Classes Editor

A liquid class is a set of liquid handling parameters. It specifies aspirating and dispensing speeds, airgaps, liquid detection modes, etc. The values of the parameters are dependent on the physical characteristics of the liquid. Freedom EVOware contains a large number of pre-defined liquid classes which are based on the extensive experience of the Tecan liquid handling specialists. Freedom EVOware stores the liquid classes in the <install_path>\Database directory) and has a built-in editor for displaying, creating and deleting liquid classes.

To open the liquid classes editor, click Liquid Classes in the Control Bar and double-click on any of the liquid classes:

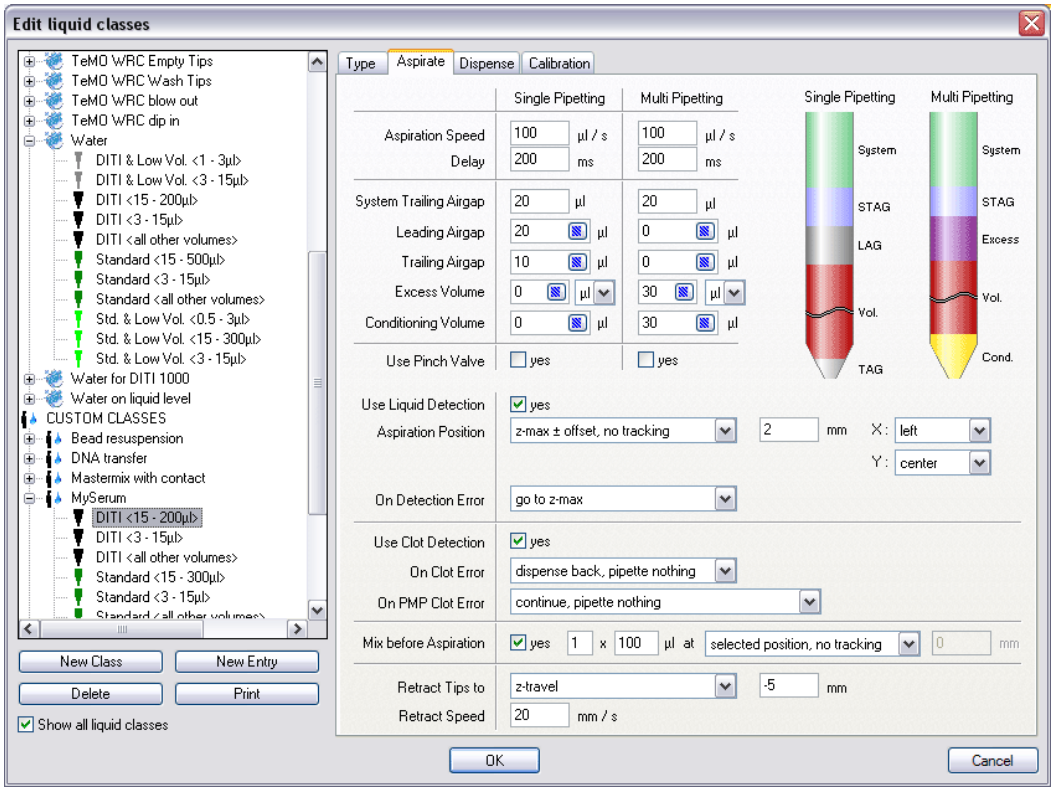


Fig. 10-1 *Aspirate tab of the Liquid Classes editor*

The left side of the window shows pre-defined liquid classes ( ) and custom liquid classes ( ). Custom liquid classes are user-defined liquid classes.

Note: *You cannot change the properties of the pre-defined (standard) liquid classes. However, you can create a new custom class with the same properties and then change them.*

Check the *Show all liquid classes* checkbox to see all available liquid classes.If this checkbox is unchecked, you will only see liquid classes which are compatible with the current tip and device configuration of your pipetting instrument.

If you check the *Show all liquid classes* checkbox and click OK to close the Liquid Classes Editor, the Liquid Classes tab of the Control Bar will also show all liquid classes. If you uncheck the *Show all liquid classes* checkbox and click OK to close the Liquid Classes Editor, the Liquid Classes tab of the Control Bar will only show liquid classes which are compatible with the current tip and device configuration.

For information on the current tip configuration, start the Configuration Tool, click the Devices tab and click Instrument Options in the General group (see Fig. 8-9 “Configuring the LiHa”, 8-25).

Each liquid class is divided into one or more sub-classes. Click the **+** symbol in front of a liquid class or double-click the liquid class name to show its sub-classes. The **+** symbol then changes to a **-** symbol. Click the **-** symbol to hide the sub-classes again.

A sub-class is characterized by the tip type and volume range for which its parameters are specified. During script runtime, Freedom EVOware selects the liquid class and sub-class that best matches the liquid class name, the currently used tip type and the pipetting volume.

If you choose an item in the liquid classes list, Freedom EVOware displays one or more parameter pages in the right side of the window. The parameter pages are described in more detail in the following chapters.

New Class

Click this button to create a new liquid class. A dialog box is shown to allow you to choose an existing liquid class as a template for the new liquid class. Choose the entry you want to use as a template and click OK. The template makes it easier to create a new liquid class since you only need to edit the parameters which are different.

Liquid classes must have unique names.

New Entry

Click this button to create a new sub-class. A dialog box is shown to allow you to choose an existing sub-class as a template for the new sub-class. Choose the entry you want to use as a template and click OK. The template makes it easier to create a new sub-class since you only need to edit the parameters which are different.

If you want to create more than one sub-class with the same name, the pipetting volume ranges must not overlap.

Delete

Click this button to delete the currently selected liquid class or sub-class.

Print

Click this button to print information on the currently selected liquid class (including every sub-class) or sub-class (single page) as a report. You are first shown a print preview window. Click the *Printer* button in the menu bar of the print preview window to print the report.

10.1.1 Global Parameters for Liquid Classes

Freedom EVOware uses these parameters for all sub-classes of the selected liquid class.

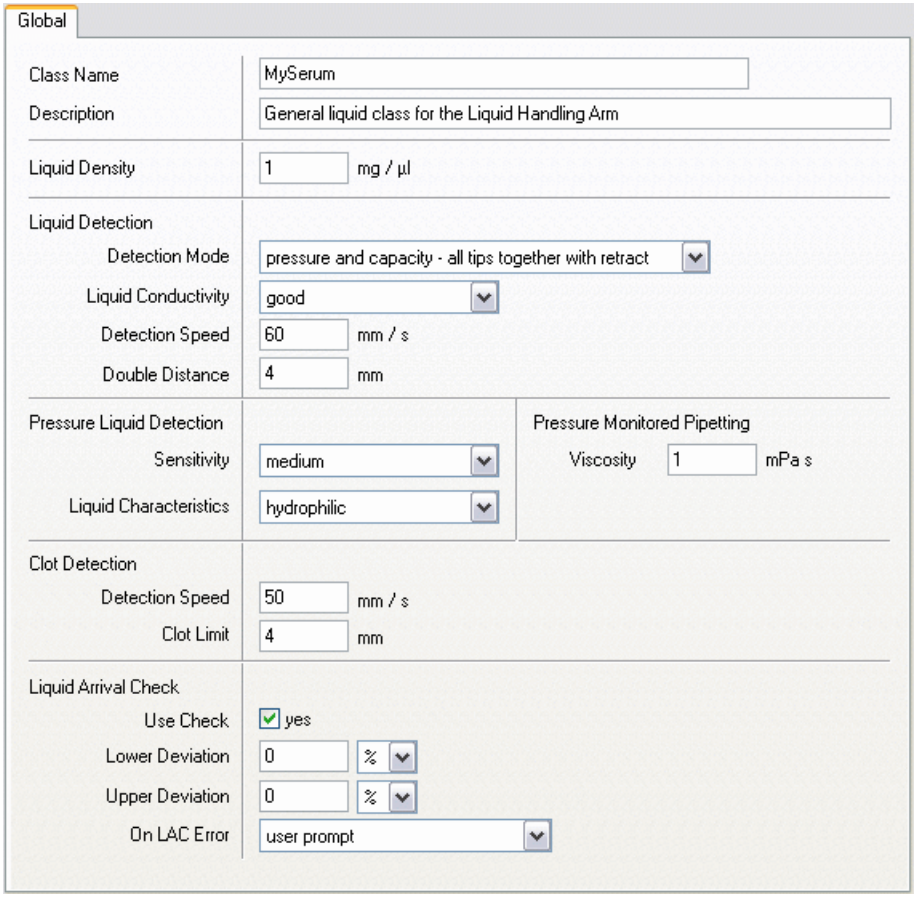


Fig. 10-2 *Global parameters for liquid classes*

Class Name

Specify a unique name for the liquid class.

Description

Enter additional information about this liquid class. The description is optional and is currently intended for documentation purposes only.

If you are using the pressure-monitored pipetting (PMP) hardware option, the description is stored in the pressure curve files which are created.

Liquid Density

Specify the density of the liquid (range: 0.1 to 10 mg/µl). The liquid arrival check function of the pooling balance option uses this parameter to calculate the pipetted liquid volume from the measured weight difference. The PMP option uses this parameter to estimate the volume of liquid which was dispensed.

Liquid Detection panel

Liquid Level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. Specify the liquid level detection parameters as follows:

- Choose the required liquid level detection mode from the pull down list. Pressure-based liquid level detection requires the PMP hardware option. Capacitive liquid level detection is always available.
- Choose the liquid conductivity from the pull down list. This setting is not available if you choose the liquid detection mode *pressure only* (pLLD).
- Choose the required detection speed (range: 0.1 to 500 mm/s).
- Choose the required double distance (range: 0.1 to 50 mm). The double distance is the distance by which the tips retract (move upwards) before carrying out liquid level detection for the second time. It is only used when a detection mode with double detection is chosen.

To enable liquid level detection, you also need to activate it on the Aspirate and/or Dispense tabs of the respective sub-class.

If you choose a combination of capacitive and pressure-based liquid level detection, both methods must indicate the same liquid level within a specified tolerance. Error messages will be generated if this is not the case.

If you are using LiHa tips (fixed tips or DITIs) and you choose *Detect with first tip, move others to same position*, 1 mm will be added to the aspiration offset you specify on the Aspirate Parameters page. See 10.2.1 “LiHa Aspirate Parameters (Fixed Tips and DiTis)”, 10-7, *Aspiration Position* for more information.

The Te-MO, the MCA96 and the MCA384 do not support liquid level detection. If you want to use a liquid class which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 14-7). The values you specify here are ignored in this case. The Te-MO and the MCA96 only use the emulated liquid level detection for aspirating. The MCA384 uses the emulated liquid level detection for aspirating and dispensing.

Pressure Liquid Detection panel

The settings in this panel are only available if you choose the liquid detection mode *pressure only* or *pressure and capacity*.

Sensitivity

Choose the required sensitivity for pressure-based liquid level detection (pLLD) from the pull down list.

Liquid Characteristics

Choose the liquid characteristics from the pull down list. You can choose between hydrophilic (water-based, conductive) and hydrophobic (non-water-based, non-conductive).

Pressure Monitored Pipetting panel

The PMP option monitors the pressure in the airgap between the sample and the system liquid during aspiration and dispensing. The PMP hardware option is only available for LiHa DiTi tips. The settings you make here will be ignored if PMP is not activated. See also 17.6 “Configuring and Using PMP (Pressure Monitored Pipetting)”, 17-16.

Viscosity

Specify the viscosity of the liquid in mPa s.

Clot Detection panel

Specify the global settings for capacitive clot detection (cLLD). You can specify the detection speed and the clot limit. The clot limit is a tolerance factor to compensate for cohesion effects. To enable clot detection, you need to check the *Use exit signal detection* checkbox on the Aspirate tab of the respective sub-class. See the description of this checkbox for more information.

The Te-MO, the MCA96 and the MCA384 do not support clot detection. The values you specify here are ignored in this case.

Liquid Arrival Check panel

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. Freedom EVOware automatically calculates the liquid volume from the weight difference and compares the results with the volume specified in the pipetting command. An LAC error is output if the two values differ by more than the maximum volume deviation which is specified in the liquid class.

The LAC feature is only supported by special balance types such as the Mettler WM pooling balance. This balance has a built-in tube rack for 16 x 13 mm tubes and is commonly used for liquid pooling operations.

See also 9.5.5.7 “Pooling Balance Carrier Attributes”, 9-53, 15.26.4 “Pooling balance data in report files”, 15-56, 8.5.31 “Settings for the Pooling Balance”, 8-110 and A.3 “Parameters in the Evoware.opt file”, A-17, [OPTIONS] section, Poolsafe_Balances.

Use Check

Check the checkbox to activate the LAC feature for this liquid class. The Liquid Arrival Check will then be carried out automatically during dispensing if you dispense this liquid type into containers (e.g. tubes) which have been put onto a pooling balance. You do not need to add a Balance command to your pipetting script to use the Liquid Arrival Check feature.

Lower deviation

Specify the required accuracy for the liquid arrival check - how close the calculated volume must be to the volume specified in the pipetting command (range: 0 to 100 µl or 0 to 10%). If the pipetted volume is too small, Freedom EVOware will write a warning message to the log file if the specified deviation is exceeded. In addition, an LAC error code will be contained in the report file output by the Export Data command.

Upper deviation

Specify the required accuracy for the liquid arrival check - how close the calculated volume must be to the volume specified in the pipetting command (range: 0 to 100 µl or 0 to 10%). If the pipetted volume is too large, Freedom EVOware will write a warning message to the log file if the specified deviation is exceeded. In addition, an LAC error code will be contained in the report file output by the Export Data command.

On LAC error

Select the required error handling if an LAC error occurs.

The error handling option *User prompt* shows the Liquid Arrival Check Error dialog (see 18.1.5 “Liquid Arrival Check Error”, 18-5) and pauses the script or process. Alternatively you can choose to ignore the error and continue without pausing. The logging of the LAC error is not affected by your choice.

10.1.2 Type Parameters for Liquid Classes

Freedom EVOware uses these parameters to select the best suited sub-class for a specified tip type and pipetting volume.

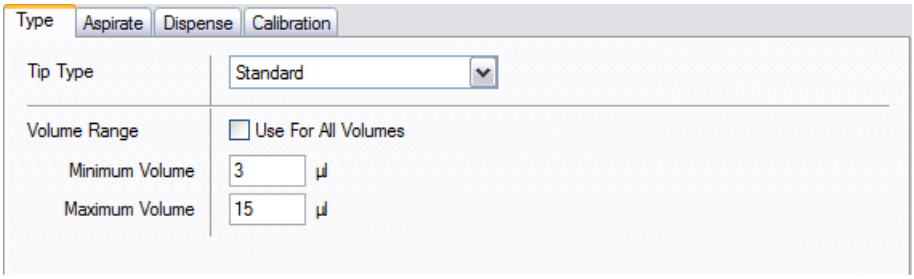


Fig. 10-3 *Type parameters for liquid classes*

Tip Type

Select the tip type. The following tip types are available:

- Standard tips
- DITI (disposable tips)
- Std. & Low Vol. (standard tips with the low volume option)
- DITI & Low Vol. (disposable tips with the low volume option)
- Te-MO Fixed tips (96 tips)
- Te-MO DITI tips (96 tips)
- Te-MO 384 (384-tip pipetting head)
- MCA96 Fixed (Multi-Channel Arm with fixed tips)
- MCA96 DITI (Multi-Channel Arm with disposable tips)
- MCA384 Fixed (Multi-Channel Arm with fixed tips)
- MCA384 DITI (Multi-Channel Arm with disposable tips)

The following options are only intended for research applications: Low Volume, Te-MO tips (all types).

Volume Range

If you check the *Use for All Volumes* checkbox, the aspirate, dispense and calibration parameters for this sub-class are valid for all pipetting volumes.

If this box is not checked, you must specify the minimum volume and the maximum volume. Freedom EVOware will then use this sub-class during pipetting if the following expression is true:

Minimum Volume ≤ pipetting volume < Maximum Volume

10.2 LiHa Liquid Classes for Fixed Tips and DiTis

The LiHa (Liquid Handling Arm) is a robot arm on the pipetting instrument which is mounted on the X-slide and typically holds four or eight pipetting tips.

10.2.1 LiHa Aspirate Parameters (Fixed Tips and DiTis)

Freedom EVOware uses these parameters when aspirating or mixing with LiHa fixed tips or DITIs. The illustrations at the top right of the dialog box show

graphically the current settings for single pipetting mode and multi pipetting mode. *Vol*. stands for the pipetted volume.

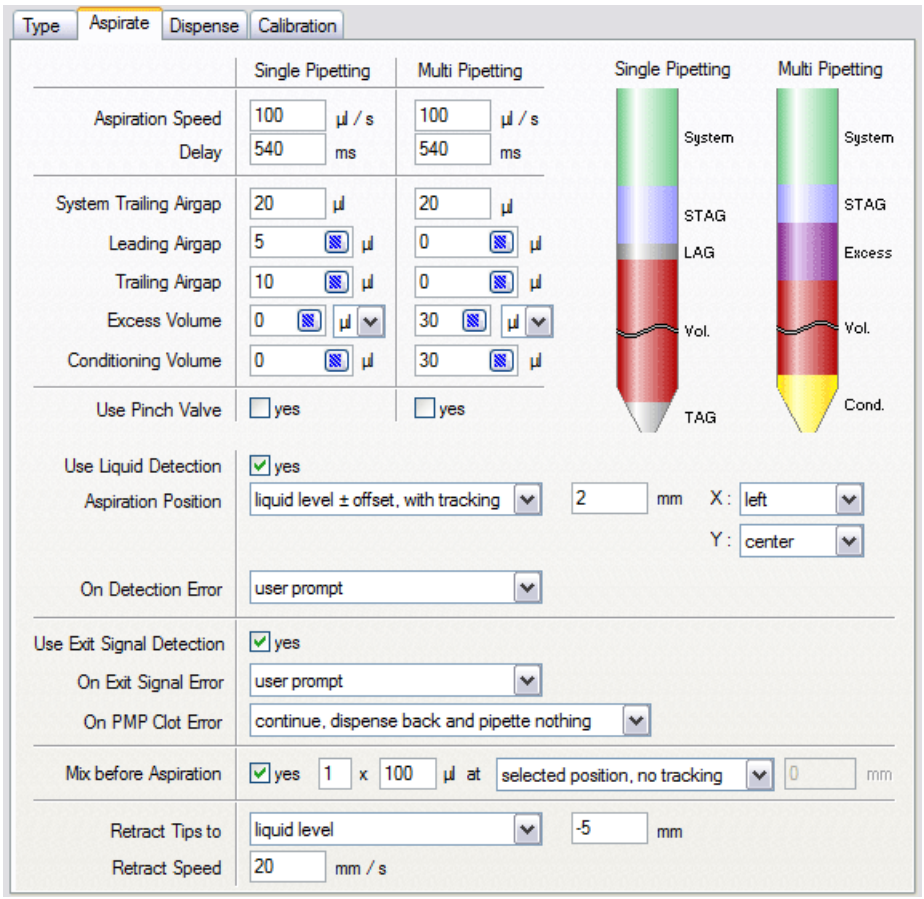


Fig. 10-4 *Aspirate parameters for fixed tips and DITIs*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Aspiration Speed

Specify the aspiration speed in µl/s. A lower aspiration speed can improve the pipetting accuracy, a higher aspiration speed can improve the speed of operation. See Tab. 8-2 “Max. dilutor speeds for the LiHa (pipetting or washing)”, 🗎 8-28 for related information.

Delay

Specify the delay after aspiration.

System Trailing Airgap (STAG)

Specify the volume of the system trailing airgap. Freedom EVOware uses the aspiration speed specified for the leading airgap for the system trailing airgap, too. The system trailing airgap is used to prevent contamination by ensuring that the system liquid cannot come into contact with the liquid being aspirated.

Leading Airgap (LAG)

Specify the volume of the leading airgap. Click the button to specify aspiration speed and delay after aspiration. The air of the leading airgap is dispensed together with the net volume which you specify in the Dispense command. The resulting tip blowout leads to more accurate pipetting.

Trailing Airgap (TAG)

Specify the volume of the trailing airgap. Click the button to specify aspiration speed and delay after aspiration. The trailing airgap is used to prevent liquid dripping from the tips when the arm moves. In addition, it ensures that the liquid meniscus is not dragged away from the end of the tip during fast arm movements.

The trailing airgap is aspirated at the Z-position specified with *Retract tips to*. A Z-position relative to the liquid level requires liquid level detection and must not be used if you are carrying out septum piercing (the septum interferes with the capacitance-based detection system). Otherwise the trailing airgap may be aspirated with the tips still in the liquid.

Excess Volume

Specify the excess volume (in µl or %). Click the button to choose the position to use for discarding the excess volume (*Discard to waste* or *Back to vessel*). The excess volume is used to reduce contamination of the liquid in the tips with the system liquid to an absolute minimum. The excess volume is discarded after the pipetting cycle (aspiration and dispensing) has been completed.

Specify a digit in the *Replace after* field to discard the excess volume after re-using it several times (e.g. to save costs). This only applies if excess volume > 0 and if you are using multi-pipetting.

Conditioning Volume

Specify the conditioning volume. Click the button to choose the position to use for discarding the conditioning volume (*Discard to waste* or *Back to vessel*). A conditioning volume can be used to maximize pipetting accuracy by ensuring that the liquid meniscus at the end of the tips is the same shape after aspirating as it will be after dispensing.The conditioning volume is discarded directly after aspirating.

Use Pinch Valve

This is used to activate the Low Volume option if it is fitted to your pipetting instrument.

Use Liquid Detection

Check this box if you want to use capacitative liquid level detection (cLLD) when aspirating. cLLD detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip enters the liquid. It is carried out just before aspirating and can be used e.g. to minimize tip contamination by limiting the tip immersion depth.

cLLD is carried out with the detection mode, liquid conductivity, detection speed and double distance settings which you specified on the Global dialog box for the liquid class.

cLLD must not be used if you are carrying out septum piercing (the septum interferes with the capacitive detection system).

Aspiration Position

Specify the Z-position and the Z-offset of the tips when aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection.

If you choose an aspirate position with tracking, the tips will move downwards as the liquid level drops in the wells during aspiration. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

If you choose *Detect with first tip, move others to same position*, on the Global Parameters page (10.1.1, 10-4) and you choose the aspiration position *z-max ± offset* (with or without tracking), 1 mm will be added to the aspiration offset you specify. Example: If you specify an offset of 2 mm, the tips will be submerged by 3 mm. This is done to make sure that all of the tips are submerged in the liquid in case of small differences in the liquid level between the wells.

You can also choose the X-position when aspirating as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when aspirating as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

On Detection Error

Select the required error handling if Freedom EVOware detects no liquid or not enough liquid.

If a liquid detection error occurs, the error handling option *User prompt* shows the Liquid Detection Error dialog (see 18.1.1 “Liquid Detection Error”, 18-1); the other three options carry out the chosen action directly and do not show the Liquid Detection Error dialog.

Use Exit Signal Detection

Check this box to activate capacitive exit signal detection (dip out signal detection). This detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip is retracted and exits the liquid. It is carried out just after aspirating. The measured liquid level is then compared with the liquid level which should have resulted from the aspiration.

You can only activate exit signal detection if you have also enabled liquid level detection.

On Exit Signal Error

Select the required error handling if the exit signal error does not take place as expected when retracting the tips.

If an exit signal error occurs, the error handling option *User prompt* shows the Clot Error dialog (see 18.1.2 “Clot Error”, 18-2); the other two options carry out the chosen action directly and do not show the Clot Error dialog.

Two error situations are possible:

– The exit signal was detected within the specified “retract tips to” distance but not within the clot limit which which you specified in the Global dialog box for the liquid class. This is probably because a clot is attached to one of the tips and has maintained the electrical contact between the tip and the liquid. A “clot error” is reported in the log file in this case.
– The exit signal was not detected at all within the specified “retract tips to” distance. In this case, there is another reason for the tips failing to loose contact with the liquid. A “no exit signal error” is reported in the log file in this case.

Note: *Both clot error and exit signal error are currently reported in the report file from the Export Data command as “clot was detected”.*

On PMP Clot Error

Select the required error handling if a clot is detected using pressure-based clot detection. Pressure-based clot detection requires the PMP hardware option. The PMP hardware option is only available for LiHa DiTi tips.

If a clot error is detected by PMP, the error handling option *User prompt* shows the Clot Error (PMP) dialog; the other three options carry out the chosen action directly and do not show the Clot Error (PMP) dialog.

If you choose *User Prompt*, the Clot Error (PMP) dialog then allows the instrument operator to choose between the following options:

– Dispense back into vessel and then pipette nothing
– Ignore clot error and continue
– Discard the DITI and pipette nothing

See 18.1.3 “Clot Error (PMP)”, 18-3 for more information.

See also *17.6.4 “PMP Error and Success Messages”,* 17-22 for more information on PMP.

Mix before Aspiration

Check this box if you want Freedom EVOware to mix the liquid before aspirating it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (range: 1 to 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection.

Retract Speed

Specify the required retract speed.

10.2.2 LiHa Dispense Parameters (Fixed Tips and DiTis)

Freedom EVOware uses these parameters when dispensing or mixing with LiHa fixed tips or DITIs.

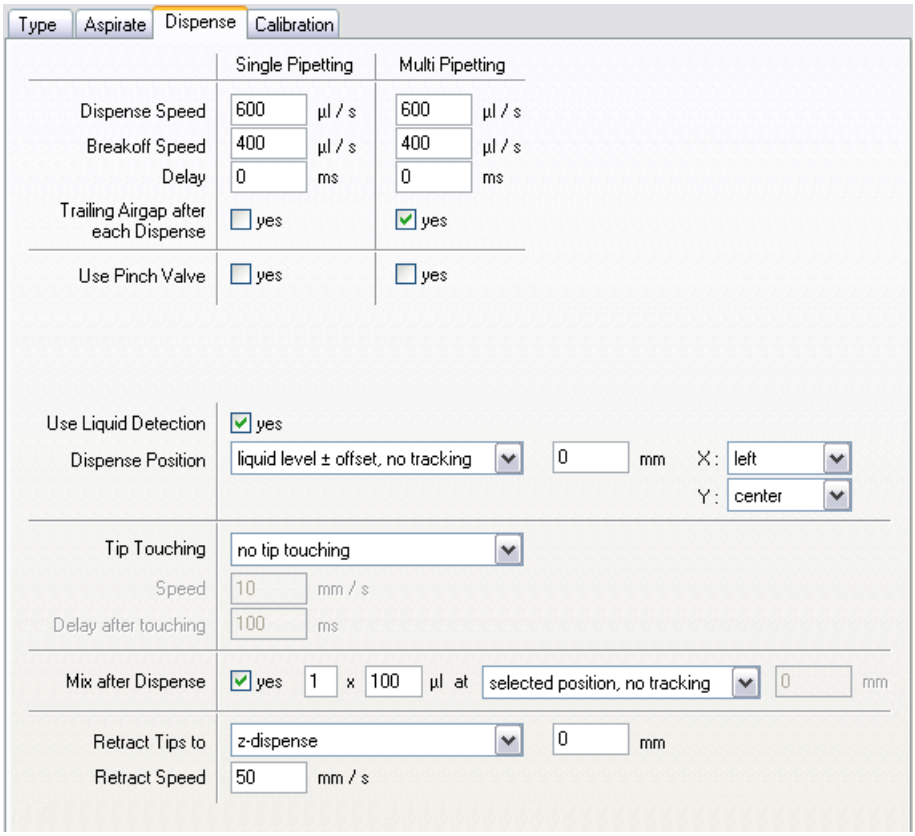


Fig. 10-5 *Dispense parameters for fixed tips and DITIs*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Dispense Speed

Specify the dispense speed in µl/s. The maximum dispense speed is about 80% of the dilutor capacity (syringe size) per second. See Tab. 8-2 “Max. dilutor speeds for the LiHa (pipetting or washing)”, 8-28.

A high dispense speed is needed to achieve a proper free dispense. Contact dispense requires a lower speed (in the same range as the aspirate speed).

Breakoff Speed

Specify the breakoff speed (final dispense speed) in µl/s. The breakoff speed should normally be about 70% of the actual dispense speed but should not exceed 45% of the the dilutor capacity (syringe size) per second. A high breakoff speed is needed to achieve a proper free dispense.

Delay

Specify the delay after dispensing.

Trailing Airgap after each Dispense

You can automatically aspirate a trailing airgap after each dispense operation to avoid droplets forming on the tips. The trailing airgap parameters for dispensing are specified in the *Aspirate* dialog box.

Use Pinch Valve

This is used to activate the Low Volume option if it is fitted to your pipetting instrument.

Use Liquid Detection

Check this box if you want to use capacitative liquid level detection (cLLD) when dispensing. cLLD detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip enters the liquid. Liquid level detection when dispensing can be used e.g. to ensure that the tips remain immersed in the liquid during dispensing.

cLLD is carried out with the detection mode, liquid conductivity, detection speed and double distance settings which you specified on the Global dialog box for the liquid class.

cLLD must not be used if you are carrying out septum piercing (the septum interferes with the capacitive detection system).

Dispense Position

Specify the Z-position and the Z-offset of the tips when dispensing. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection.

If you choose a dispense position with tracking, the tips will move upwards as the liquid level rises in the wells during dispensing. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when dispensing as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when dispensing as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

Tip Touching

Activate the tip touching function if required and specify the direction of the movement. The amount of movement is specified with *Tip-touching distance* for the labware which is used.

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tips.

Speed: Specify the tip touching speed.

Delay after touching: Specify the delay between the tip touching the well and moving back to the middle of the well.

Mix after Dispense

Check this box if you want to mix the liquid after dispensing it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (range: 1 to 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after dispensing. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection.

Retract Speed

Specify the required retract speed.

10.2.3 LiHa Calibration Parameters (Fixed Tips and DiTis)

Freedom EVOware uses these parameters to ensure that the specified net volumes are dispensed accurately by the LiHa. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.

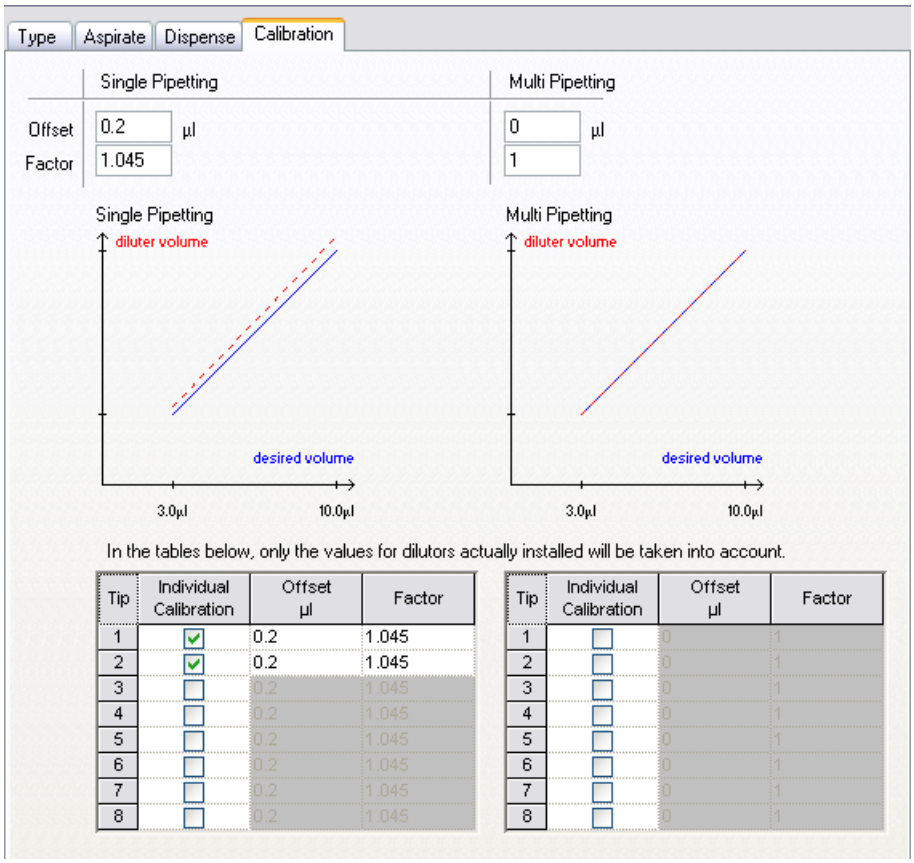


Fig. 10-6 *Calibration parameters for fixed tips and DITIs*

The parameters of this dialog box are as follows:

Offset / Factor

Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the dilutor movement from the net volume specified in the pipetting script:

Calibrated dilutor movement = (net volume * factor) + offset

Individual calibration tables

If necessary you can specify a separate offset and calibration factor for each of the dilutors which overrides the global setting. This can be used to compensate for very small differences in the characteristics of the dilutors due to manufacturing tolerances. It is only needed for special applications which require extreme accuracy and is only available for the LiHa (the Te-MO, the MCA96 and the MCA384 do not use dilutors). The individual calibration settings can be made separately for single pipetting and multi pipetting.

Please note the following if you specify an individual dilutor calibration factor or offset:

- The individual calibration settings are only intended for specialists such as Tecan Field Service Engineers.
- Before changing the calibration settings, make sure that the pipetting inaccuracy has been caused by the dilutor and that all other possibilities such as tubing problems or air bubbles have been ruled out.
- The calibration settings must be determined and verified gravimetrically for the liquids and volume ranges in question.
- The calibration settings are only valid for the type of liquid used during testing.
- The calibration settings only apply to Freedom EVOware and do not affect the gravimetric tests using the *Setup & Service* software.
- The values must be reset if you change the dilutor.

10.3 MCA96 Liquid Classes

The MCA96 (Multi Channel Arm 96) has a 96-tip pipetting head. The 96-tip pipetting head can be fitted with a tipblock (fixed tips) or with disposable tips (DITIs).

10.3.1 MCA96 Aspirate Parameters

Freedom EVOware uses these parameters for the MCA96 pipetting head when aspirating or mixing. The illustrations at the top right of the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode. *Vol*. stands for the pipetted volume.

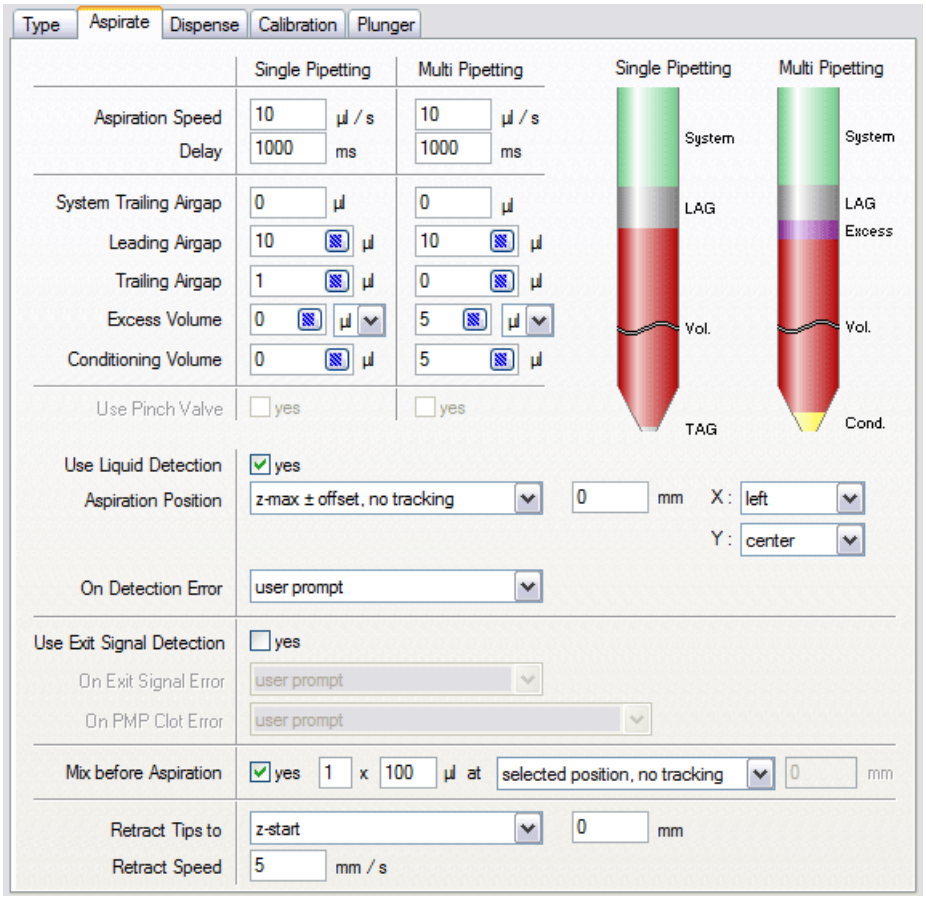


Fig. 10-7 *MCA96 Aspirate parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Aspiration Speed

Specify the aspiration speed in µl/s. A lower aspiration speed can improve the pipetting accuracy, a higher aspiration speed can improve the speed of operation.

Delay

Specify the delay after aspiration.

System Trailing Airgap (STAG)

Specify the volume of air to aspirate directly after getting the tip block or DITIs (recommended range: 0 to 50 µl). Freedom EVOware uses the aspiration speed specified for the leading airgap for the system trailing airgap, too.

When washing the tips, the air is dispensed during the empty step of the Wash command together with the remaining liquid. The STAG ensures that all of the liquid in the tips is discarded at the start of the wash procedure. This helps to reduce the carryover. In contrast to the leading airgap, the STAG is only relevant for washing the tips and is not dispensed by the Dispense command.

Leading Airgap (LAG)

Specify the volume of the leading airgap. Click the button to specify aspiration speed and delay after aspiration. The air of the leading airgap is dispensed together with the net volume which you specify in the Dispense command. The resulting tip blowout leads to more accurate pipetting.

Trailing Airgap (TAG)

Specify the volume of the trailing airgap. Click the button to specify aspiration speed and delay after aspiration. The trailing airgap is used to prevent liquid dripping from the tips when the arm moves. In addition, it ensures that the liquid meniscus is not dragged away from the end of the tip during fast arm movements.

Excess Volume

Specify the excess volume (in µl or %). Click the button to choose the position to use for discarding the excess volume (*Discard to waste* or *Back to vessel*). The excess volume is used to reduce contamination of the liquid in the tips with previously used liquids to an absolute minimum.

Specify a digit in the *Replace after* field to discard the excess volume after re-using it several times (e.g. to save costs). This only applies if excess volume > 0 and if you are using multi-pipetting. The excess volume is discarded after the pipetting cycle (aspiration and dispensing) has been completed.

Conditioning Volume

Specify the conditioning volume. Click the button to choose the position to use for discarding the conditioning volume (*Discard to waste* or *Back to vessel)*. A conditioning volume can be used to maximize pipetting accuracy by ensuring that the liquid meniscus at the end of the tips is the is the same shape after aspirating as it will be after dispensing. The conditioning volume is discarded directly after aspirating.

Use Pinch Valve

The MCA96 does not have a pinch valve.

Use Liquid Detection

The MCA96 does not support liquid level detection for aspiration directly. If you want to use a liquid class for the MCA96 which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 14-7). Check this checkbox if you want to activate the emulated liquid level detection. Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. For Freedom EVOware Plus, see 14.1.4 “Pre-Defined Variables”, 14-4 for information on accessing the current value of this pre-defined variable in another script.

Aspiration Position

Specify the Z-position and the Z-offset of the tips when aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection emulation.

If you choose an aspirate position with tracking, the tips move downwards as the liquid level drops in the wells during aspiration. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when aspirating as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when aspirating as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

On Detection Error

Select the required error handling if Freedom EVOware detects no liquid or not enough liquid.

Use Exit Signal Detection

The MCA96 does not support exit signal detection. The PMP option is not available for the MCA96.

Mix before Aspiration

Check this box if you want Freedom EVOware to mix the liquid before aspirating it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after aspirating. A positive value for the offset lowers the tips.

Retract Speed

Specify the required retract speed.

10.3.2 MCA96 Dispense Parameters

Freedom EVOware uses these parameters for the MCA96 pipetting head when dispensing or mixing.

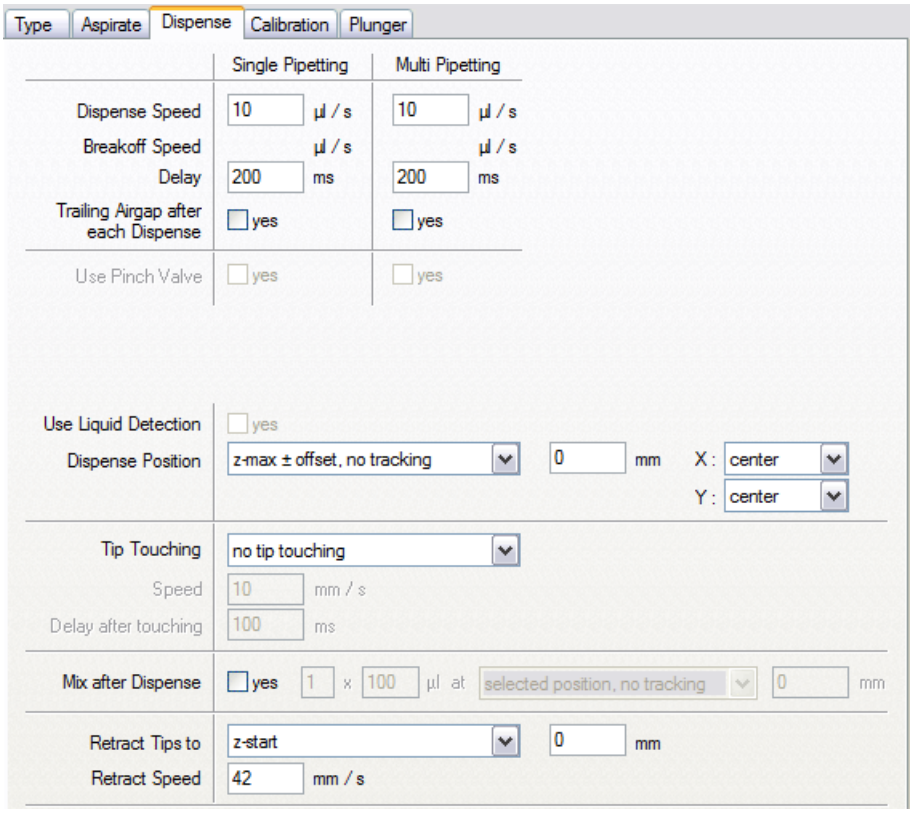


Fig. 10-8 *MCA96 Dispense parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Dispense Speed

Specify the dispense speed in µl/s. A high speed (400-600 µl/s) is needed to achieve a proper free dispense. Contact dispense requires a lower speed (in the same range as the aspirate speed).

Breakoff Speed

You cannot specify a breakoff speed for the MCA96.

Delay

Specify the delay after dispensing.

Trailing Airgap after each Dispense

You can automatically aspirate a trailing airgap after each dispense operation in order to avoid droplets forming on the tip. The trailing airgap parameters are specified in the *Aspirate* dialog box.

Use Pinch Valve

The MCA96 does not have a pinch valve.

Use Liquid Detection

The MCA96 does not support liquid level detection (or emulated liquid level detection) for dispensing.

Dispense Position

Specify the Z-position and the Z-offset of the tips when dispensing. A positive value for the offset lowers the tips.

If you choose a dispense position with tracking, the tips move upwards as the liquid level rises in the wells during dispensing. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when dispensing as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when dispensing as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

Tip Touching

Activate the tip touching function if required and specify the direction of the movement. The amount of movement is specified with *Tip-touching distance* for the labware which is used.

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tips.

Speed: Specify the tip touching speed.

Delay after touching: Specify the delay between the tip touching the well and moving back to the middle of the well.

Mix after Dispense

Check this box if you want to mix the liquid after dispensing it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after dispensing. A positive value for the offset lowers the tips.

Retract Speed

Specify the required retract speed.

10.3.3 MCA96 Calibration Parameters

Freedom EVOware uses these parameters for the MCA96 pipetting head to ensure that the specified net volumes are dispensed accurately. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.

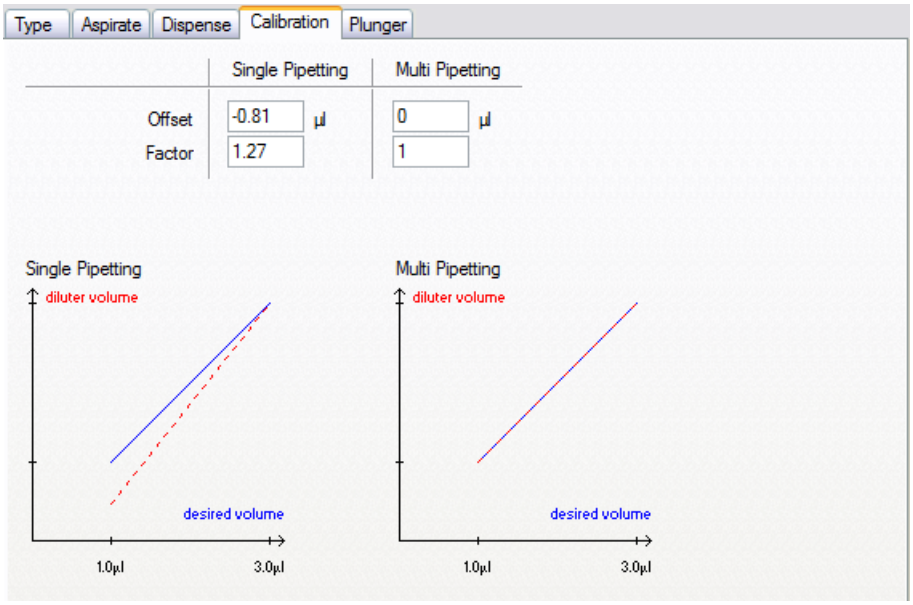


Fig. 10-9 *MCA96 Calibration parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Offset / Factor

Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the MCA96 plunger movement from the net volume specified in the pipetting script:

Calibrated MCA96 plunger movement = (net volume * factor) + offset

10.3.4 MCA96 Plunger Parameters

Freedom EVOware uses these parameters for the MCA96 pipetting head to control the plunger during dispensing. The graph illustrates the plunger speed versus the time for the specified dispense volume.

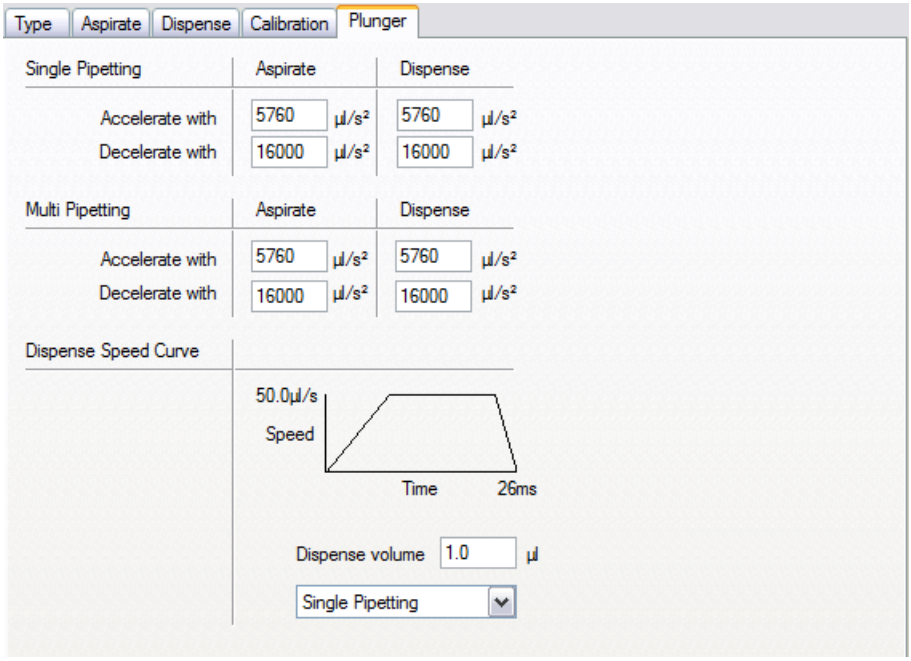


Fig. 10-10 *MCA96 Plunger parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Accelerate with / Decelerate with

Specify the required acceleration and deceleration of the MCA96 plunger for single pipetting mode and multi pipetting mode. For mechanical reasons the MCA96 plunger cannot accelerate or decelerate instantly. The graph then illustrates the plunger speed versus the time for the specified dispense volume.

Dispense volume

Specify the dispense volume for which you want to see a graph (the volume you specify should include the leading and trailing airgaps) and choose the graph you want to see (single pipetting mode or multi pipetting mode). The volume you specify is only used to calculate the graph and is not a dispense command for the MCA96 (the volume which will be dispensed is specified with the MCA96 Dispense command).

The graph helps you to identify whether you have chosen suitable settings in this dialog box.

If the graph has a flat top (plateau), the plunger acceleration/deceleration will allow the plunger to reach the dispense speed specified on the Dispense tab of the liquid class for the dispense volume you have chosen.

10.4 MCA384 Liquid Classes

The MCA384 (Multi Channel Arm) can be fitted with 96 or 384 fixed tips or with 96 or 384 disposable tips (DITIs). So-called head adapters are used to adapt the pipetting head to the different tip types.

10.4.1 MCA384 Aspirate Parameters

Freedom EVOware uses these parameters for the MCA384 pipetting head when aspirating or mixing. The illustrations at the top right of the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode. *Vol.* stands for the pipetted volume.

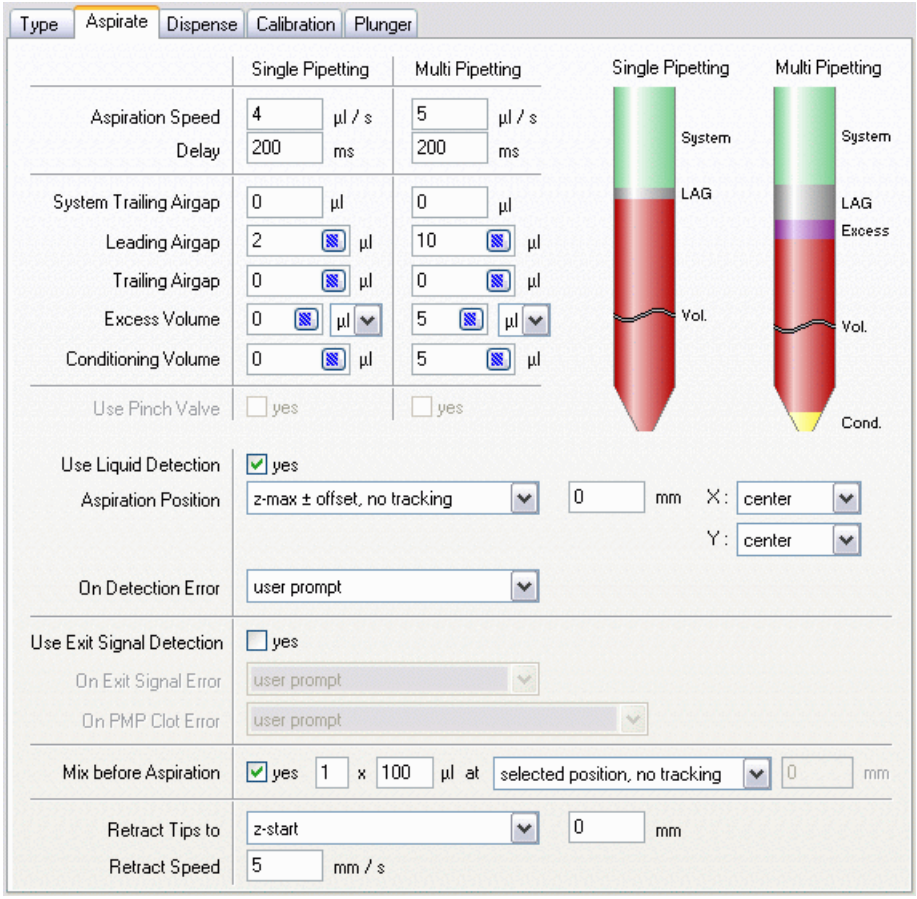


Fig. 10-11 *MCA384 Aspirate parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Aspiration Speed

Specify the aspiration speed in µl/s. A lower aspiration speed can improve the pipetting accuracy, a higher aspiration speed can improve the speed of operation.

Delay

Specify the delay after aspiration.

System Trailing Airgap (STAG)

Specify the volume of air to aspirate directly after getting the tip block or DITIs (recommended range: 0 to 50 µl). Freedom EVOware uses the aspiration speed specified for the leading airgap for the system trailing airgap, too.

When washing the tips, the air is dispensed during the empty step of the Wash command together with the remaining liquid. The STAG ensures that all of the liquid in the tips is discarded at the start of the wash procedure. This helps to reduce the carryover. In contrast to the leading airgap, the STAG is only relevant for washing the tips and is not dispensed by the Dispense command.

Leading Airgap (LAG)

Specify the volume of the leading airgap. Click the button to specify aspiration speed and delay after aspiration. The air of the leading airgap is dispensed together with the net volume which you specify in the Dispense command. The resulting tip blowout leads to more accurate pipetting.

Trailing Airgap (TAG)

Specify the volume of the trailing airgap. Click the button to specify aspiration speed and delay after aspiration. The trailing airgap is used to prevent liquid dripping from the tips when the arm moves. In addition, it ensures that the liquid meniscus is not dragged away from the end of the tip during fast arm movements.

Excess Volume

Specify the excess volume (in µl or %). Click the button to choose the position to use for discarding the excess volume (*Discard to waste* or *Back to vessel*). The excess volume is used to reduce contamination of the liquid in the tips with previously used liquids to an absolute minimum.

Specify a digit in the *Replace after* field to discard the excess volume after re-using it several times (e.g. to save costs). This only applies if excess volume > 0 and if you are using multi-pipetting. The excess volume is discarded after the pipetting cycle (aspiration and dispensing) has been completed.

Conditioning Volume

Specify the conditioning volume. Click the button to choose the position to use for discarding the conditioning volume (*Discard to waste* or *Back to vessel)*. A conditioning volume can be used to maximize pipetting accuracy by ensuring that the liquid meniscus at the end of the tips is the is the same shape after aspirating as it will be after dispensing. The conditioning volume is discarded directly after aspirating.

Use Pinch Valve

The MCA384 does not have a pinch valve.

Use Liquid Detection

The MCA384 does not support liquid level detection for aspiration directly. If you want to use a liquid class for the MCA384 which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 14-7). Check this checkbox if you want to activate the emulated liquid level detection. Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. For Freedom EVOware Plus, see 14.1.4 “Pre-Defined Variables”, 14-4 for information on accessing the current value of this pre-defined variable in another script.

Aspiration Position

Specify the Z-position and the Z-offset of the tips when aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection emulation.

If you choose an aspirate position with tracking, the tips move downwards as the liquid level drops in the wells during aspiration. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when aspirating as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when aspirating as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

On Detection Error

Select the required error handling if Freedom EVOware detects no liquid or not enough liquid.

Use Exit Signal Detection

The MCA384 does not support exit signal detection. The PMP option is not available for the MCA384.

Mix before Aspiration

Check this box if you want Freedom EVOware to mix the liquid before aspirating it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after aspirating. A positive value for the offset lowers the tips.

Retract Speed

Specify the required retract speed.

10.4.2 MCA384 Dispense Parameters

Freedom EVOware uses these parameters for the MCA384 pipetting head when dispensing or mixing.

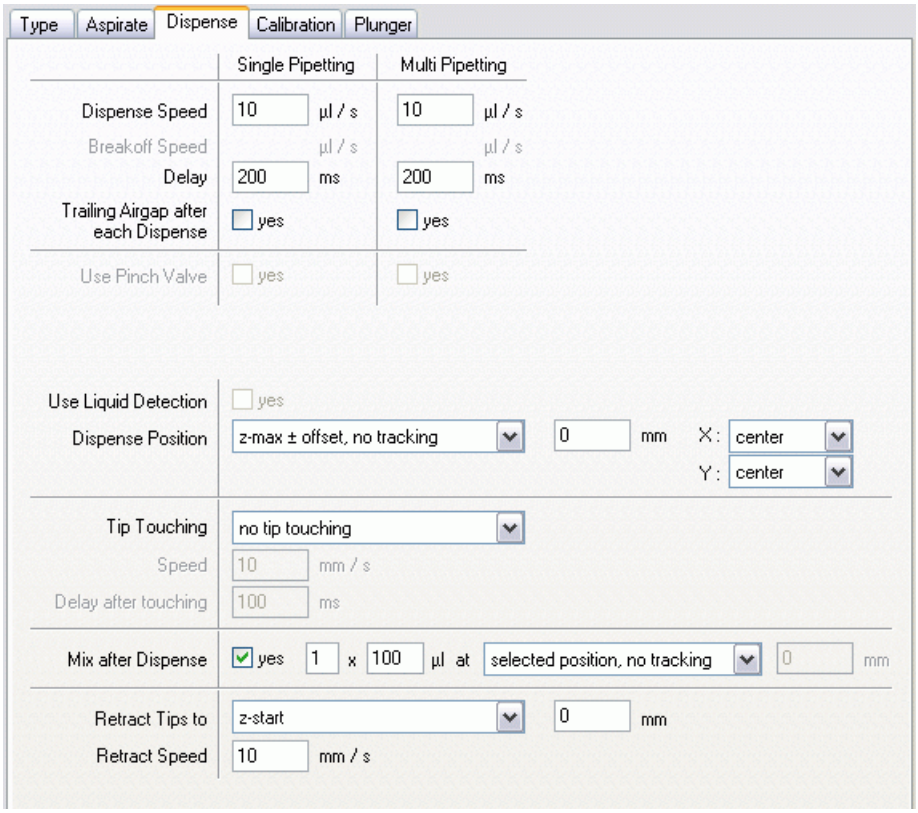


Fig. 10-12 *MCA384 Dispense parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Dispense Speed

Specify the dispense speed in µl/s. A high speed (400-600 µl/s) is needed to achieve a proper free dispense. Contact dispense requires a lower speed (in the same range as the aspirate speed).

Breakoff Speed

You cannot specify a breakoff speed for the MCA384.

Delay

Specify the delay after dispensing.

Trailing Airgap after each Dispense

You can automatically aspirate a trailing airgap after each dispense operation in order to avoid droplets forming on the tip. The trailing airgap parameters are specified in the *Aspirate* dialog box.

Use Pinch Valve

The MCA384 does not have a pinch valve.

Use Liquid Detection

The MCA384 does not support liquid level detection for dispensing directly. If you want to use a liquid class for the MCA384 which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 14-7). Check this checkbox if you want to activate the emulated liquid level detection. Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. For Freedom EVOware Plus, see 14.1.4 “Pre-Defined Variables”, 14-4 for information on accessing the current value of this pre-defined variable in another script.

Dispense Position

Specify the Z-position and the Z-offset of the tips when dispensing. A positive value for the offset lowers the tips.

If you choose a dispense position with tracking, the tips move upwards as the liquid level rises in the wells during dispensing. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when dispensing as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when dispensing as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

Tip Touching

Activate the tip touching function if required and specify the direction of the movement. The amount of movement is specified with *Tip-touching distance* for the labware which is used.

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tips.

Speed: Specify the tip touching speed.

Delay after touching: Specify the delay between the tip touching the well and moving back to the middle of the well.

Mix after Dispense

Check this box if you want to mix the liquid after dispensing it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after dispensing. A positive value for the offset lowers the tips.

Retract Speed

Specify the required retract speed.

10.4.3 MCA384 Calibration Parameters

Freedom EVOware uses these parameters for the MCA384 pipetting head to ensure that the specified net volumes are dispensed accurately. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.

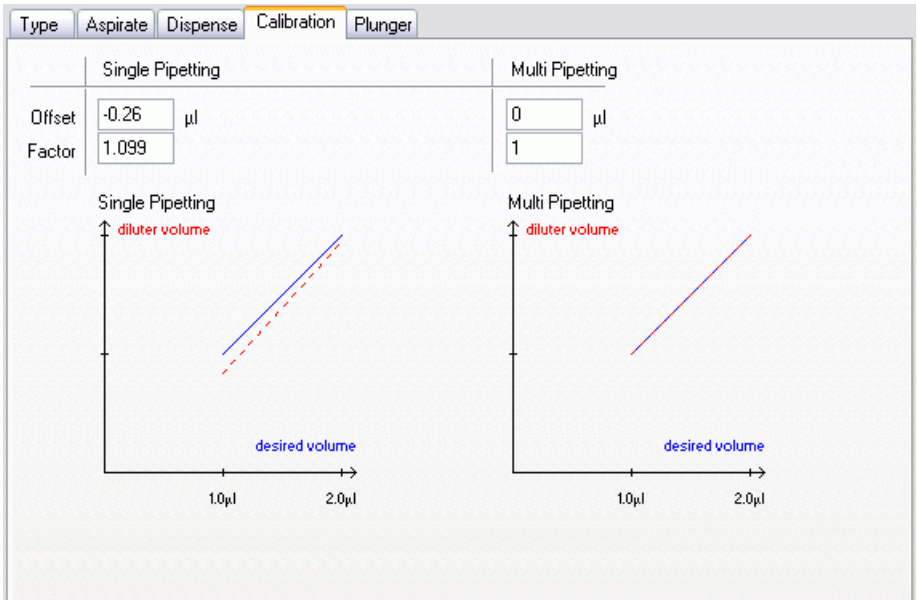


Fig. 10-13 *MCA384 Calibration parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Offset / Factor

Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the MCA384 plunger movement from the net volume specified in the pipetting script:

Calibrated MCA384 plunger movement = (net volume * factor) + offset

10.4.4 MCA384 Plunger Parameters

Freedom EVOware uses these parameters for the MCA384 pipetting head to control the plunger during dispensing. The graph illustrates the plunger speed versus the time for the specified dispense volume.

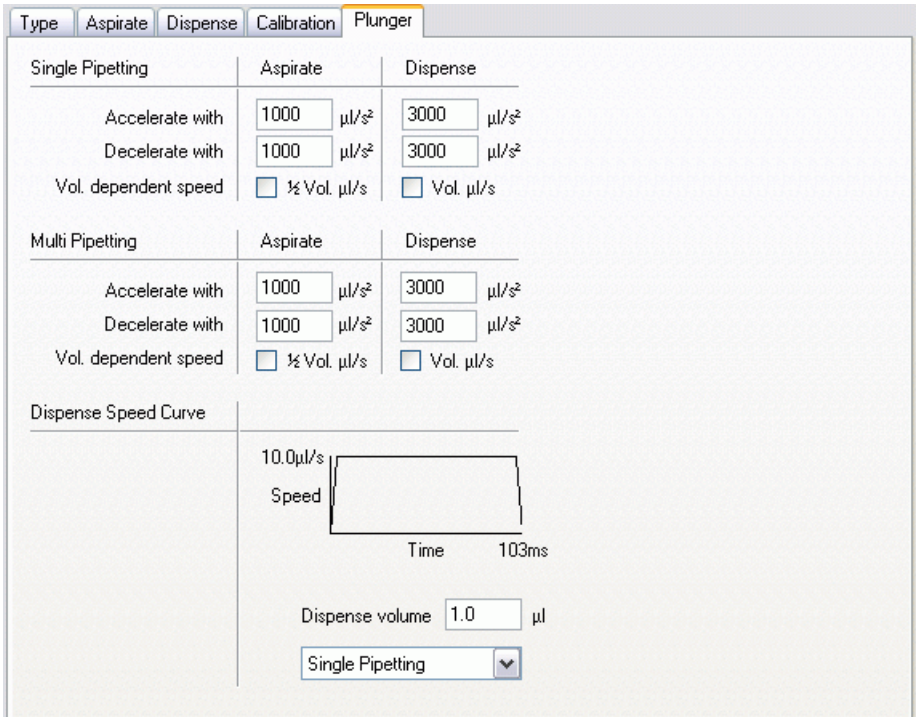


Fig. 10-14 *MCA384 Plunger parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Accelerate with / Decelerate with

Specify the required acceleration and deceleration of the MCA384 plunger for single pipetting mode and multi pipetting mode. For mechanical reasons the MCA384 plunger cannot accelerate or decelerate instantly. The graph then illustrates the plunger speed versus the time for the specified dispense volume.

Vol. dependent speed

Check these checkboxes to use a pipetting speed which is dependent on the volume you want to pipette. The aspiration and/or dispense speed which you choose on the aspirate and/or dispense tabs will be ignored and the following pipetting speeds will be used instead:

- ½ Vol. µl/s: The volume you choose in the Aspirate command will be aspirated in 2 seconds.
- Vol. µl/s: The volume you choose in the Dispense command will be dispensed in 1 second.

Dispense volume

Specify the dispense volume for which you want to see a graph (the volume you specify should include the leading and trailing airgaps) and choose the graph you want to see (single pipetting mode or multi pipetting mode). The volume you specify is only used to calculate the graph and is not a dispense command for the MCA384 (the volume which will be dispensed is specified with the MCA384 Dispense command).

The graph helps you to identify whether you have chosen suitable settings in this dialog box.

If the graph has a flat top (plateau), the plunger acceleration/deceleration will allow the plunger to reach the dispense speed specified on the Dispense tab of the liquid class for the dispense volume you have chosen.

10.5 Te-MO 96 Liquid Classes

The Te-MO is available with a 96-tip or 384-tip pipetting head. The following settings apply to the 96-tip version. The 96-tip pipetting head can be fitted with a tipblock (fixed tips) or with disposable tips (DITIs).

10.5.1 Te-MO 96 Aspirate Parameters

Freedom EVOware uses these parameters when aspirating or mixing with the 96-tip Te-MO tip block or DITI pipetting head. The illustrations at the top right of the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode. *Vol*. stands for the pipetted volume.

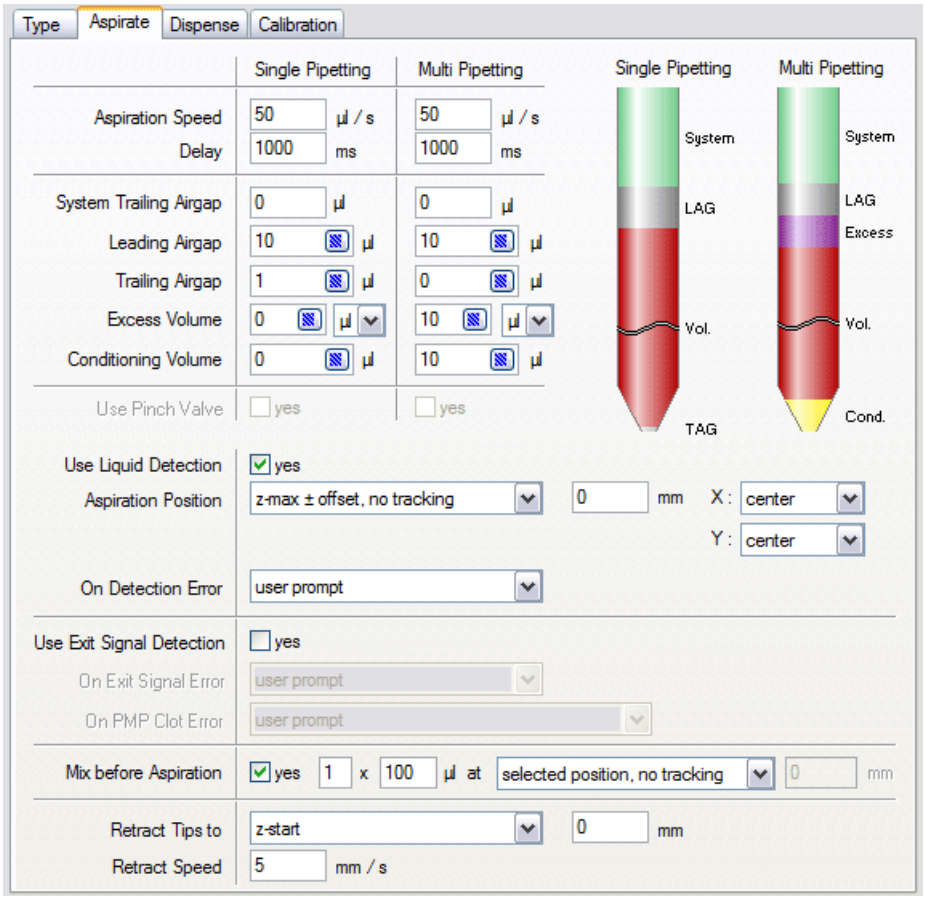


Fig. 10-15 *Te-MO 96 Aspirate parameters for the tip block and DITIs*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Aspiration Speed

Specify the aspiration speed in µl/s. A lower aspiration speed can improve the pipetting accuracy, a higher aspiration speed can improve the speed of operation.

Delay

Specify the delay after aspiration.

System Trailing Airgap (STAG)

Specify the volume of air to aspirate directly after getting the tip block or DITIs (recommended range: 0 to 50 µl). Freedom EVOware uses the aspiration speed specified for the leading airgap for the system trailing airgap, too.

When washing the tips, the air is dispensed during the empty step of the Wash command together with the remaining liquid. The STAG ensures that all of the liquid in the tips is discarded at the start of the wash procedure. This helps to reduce the carryover. In contrast to the leading airgap, the STAG is only relevant for washing the tips and is not dispensed by the Dispense command.

Leading Airgap (LAG)

Specify the volume of the leading airgap. Click the button to specify aspiration speed and delay after aspiration. The air of the leading airgap is dispensed together with the net volume which you specify in the Dispense command. The resulting tip blowout leads to more accurate pipetting.

Trailing Airgap (TAG)

Specify the volume of the trailing airgap. Click the button to specify aspiration speed and delay after aspiration. The trailing airgap is used to prevent liquid dripping from the tips when the arm moves. In addition, it ensures that the liquid meniscus is not dragged away from the end of the tip during fast arm movements.

Excess Volume

Specify the excess volume (in µl or %). Click the button to choose the position to use for discarding the excess volume (*Discard to waste* or *Back to vessel*). The excess volume is used to reduce contamination of the liquid in the tips with previously used liquids to an absolute minimum.

Specify a digit in the *Replace after* field to discard the excess volume after re-using it several times (e.g. to save costs). This only applies if excess volume > 0 and if you are using multi-pipetting. The excess volume is discarded after the pipetting cycle (aspiration and dispensing) has been completed.

Conditioning Volume

Specify the conditioning volume. Click the button to choose the position to use for discarding the conditioning volume (*Discard to waste* or *Back to vessel)*. A conditioning volume can be used to maximize pipetting accuracy by ensuring that the liquid meniscus at the end of the tips is the is the same shape after aspirating as it will be after dispensing. The conditioning volume is discarded directly after aspirating.

Use Pinch Valve

The Te-MO does not have a pinch valve.

Use Liquid Detection

The Te-MO does not support liquid level detection for aspiration directly. If you want to use a liquid class for the Te-MO which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 🗎 14-7). Check this checkbox if you want to activate the emulated liquid level detection. Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. For Freedom EVOware Plus, see 14.1.4 “Pre-Defined Variables”, 🗎 14-4 for information on accessing the current value of this pre-defined variable in another script.

Aspiration Position

Specify the Z-position and the Z-offset of the tips when aspirating. A positive value for the offset lowers the tips. You can only choose a Z-position relative to the liquid level if you have activated liquid level detection emulation.

If you choose an aspirate position with tracking, the tips move downwards as the liquid level drops in the wells during aspiration. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when aspirating as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when aspirating as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

On Detection Error

Select the required error handling if Freedom EVOware detects no liquid or not enough liquid.

Use Exit Signal Detection

The Te-MO does not support exit signal detection. The PMP option is not available for the Te-MO.

Mix before Aspiration

Check this box if you want Freedom EVOware to mix the liquid before aspirating it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after aspirating. A positive value for the offset lowers the tips.

Retract Speed

Specify the required retract speed.

10.5.2 Te-MO 96 Dispense Parameters

Freedom EVOware uses these parameters when dispensing or mixing with the 96-tip Te-MO tip block or DITI pipetting head.

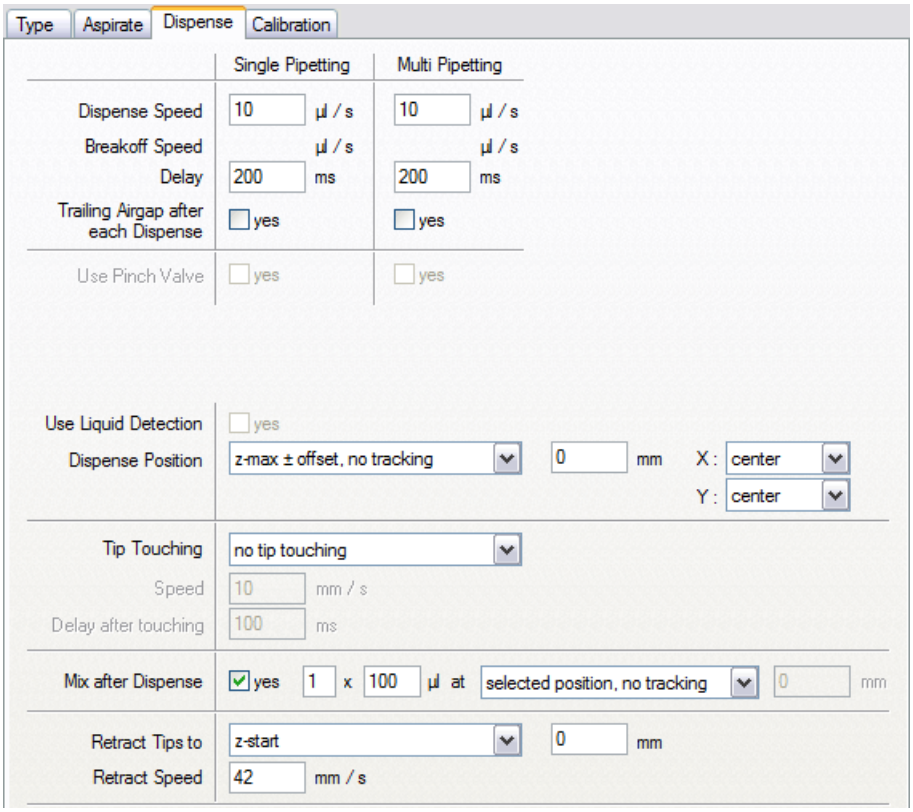


Fig. 10-16 *Te-MO 96 Dispense parameters for the tip block and DITIs*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Dispense Speed

Specify the dispense speed in µl/s. A high speed (400-600 µl/s) is needed to achieve a proper free dispense. Contact dispense requires a lower speed (in the same range as the aspirate speed).

Breakoff Speed

You cannot specify a breakoff speed for the Te-MO.

Delay

Specify the delay after dispensing.

Trailing Airgap after each Dispense

You can automatically aspirate a trailing airgap after each dispense operation in order to avoid droplets forming on the tip. The trailing airgap parameters are specified in the *Aspirate* dialog box.

Use Pinch Valve

The Te-MO does not have a pinch valve.

Use Liquid Detection

The Te-MO does not support liquid level detection (or emulated liquid level detection) for dispensing.

Dispense Position

Specify the Z-position and the Z-offset of the tips when dispensing. A positive value for the offset lowers the tips.

If you choose a dispense position with tracking, the tips move upwards as the liquid level rises in the wells during dispensing. This option can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth.

You can also choose the X-position when dispensing as follows:

- Center: as specified for the labware which is used
- Left: left of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right: right of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Left / Right: left of center for odd columns, right of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Right / Left: right of center for odd columns, left of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

You can also choose the Y-position when dispensing as follows:

- Center: as specified for the labware which is used
- Rear: rear of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front: front of center; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Rear / Front: rear of center for odd columns, front of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used
- Front / Rear: front of center for odd columns, rear of center for even columns; the offset is specified with *X or Y offset while pipetting* for the labware which is used

By combining an X offset and a Y offset, there are nine possible pipetting positions (including the center position with no offsets).

Tip Touching

Activate the tip touching function if required and specify the direction of the movement. The amount of movement is specified with *Tip-touching distance* for the labware which is used.

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but then moves the tips to the side of the well and back before retracting them. This helps to remove any droplets which may be adhering to the tips.

Speed: Specify the tip touching speed.

Delay after touching: Specify the delay between the tip touching the well and moving back to the middle of the well.

Mix after Dispense

Check this box if you want to mix the liquid after dispensing it. You can specify the number of mix cycles (range: 1 to 99), the mix volume (max. 2500 µl), the Z-position and the Z-offset. A positive value for the offset lowers the tips.

Retract Tips to

Specify the Z-position and the Z-offset to which the tips should retract (move upwards) after dispensing. A positive value for the offset lowers the tips.

Retract Speed

Specify the required retract speed.

10.5.3 Te-MO 96 Calibration Parameters

Freedom EVOware uses these parameters for the 96-tip Te-MO tip block or DITI pipetting head to ensure that the specified net volumes are dispensed accurately. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.

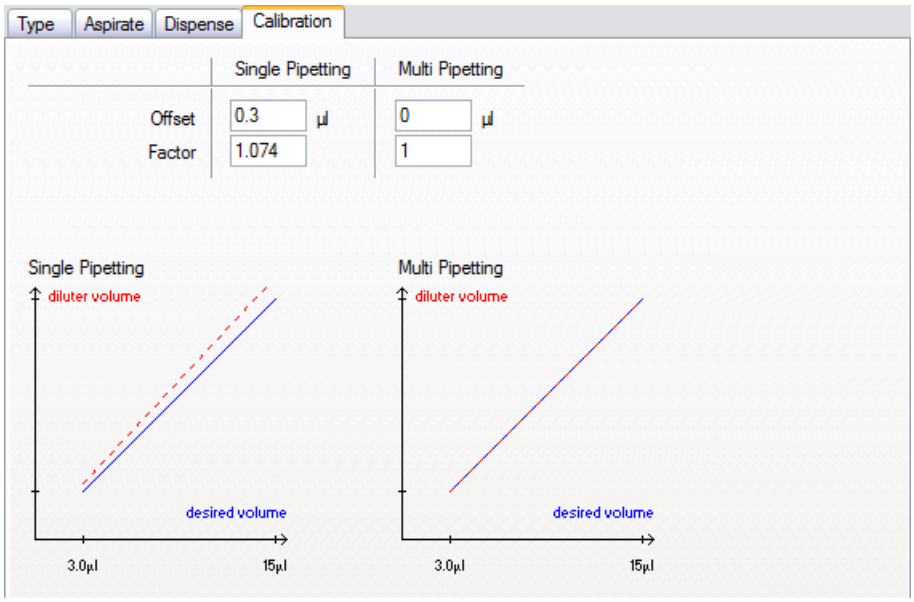


Fig. 10-17 *Te-MO 96 Calibrate parameters for the tip block and DITIs*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Offset / Factor

Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the Te-MO plunger movement from the net volume specified in the pipetting script:

Calibrated Te-MO plunger movement = (net volume * factor) + offset

10.6 Te-MO 384 Liquid Classes

The Te-MO is available with a 96-tip or 384-tip pipetting head. The following settings apply to the 384-tip version. The 384-tip pipetting head can be fitted with a tipblock (fixed tips) but not with disposable tips (DITIs).

10.6.1 Te-MO 384 Aspirate Parameters

Freedom EVOware uses these parameters for the 384-tip Te-MO pipetting head when aspirating or mixing. The illustrations at the top right of the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode. *Vol.* stands for the pipetted volume.

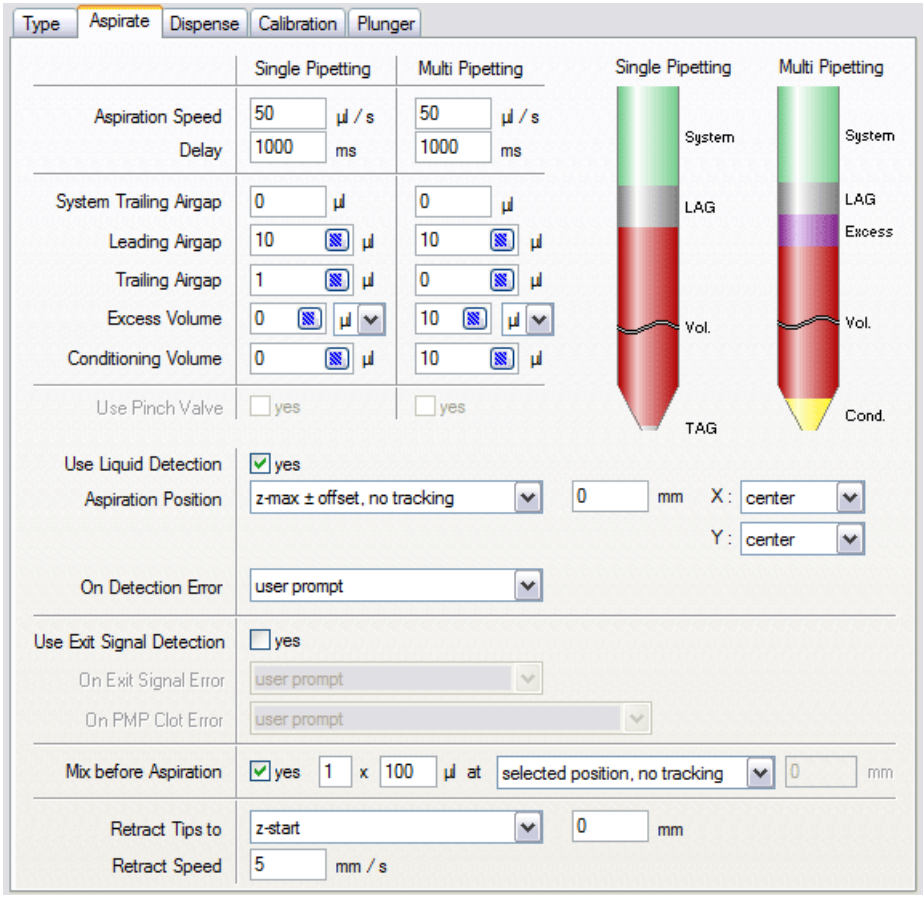


Fig. 10-18 *Te-MO 384 Aspirate parameters*

See 10.5.1 “Te-MO 96 Aspirate Parameters”, 10-32 for details of the parameters.

The Te-MO 384 does not have a pinch valve and does not support exit signal detection. The PMP option is not available for the Te-MO.

10.6.2 Te-MO 384 Dispense Parameters

Freedom EVOware uses these parameters for the 384-tip Te-MO pipetting head when dispensing or mixing.

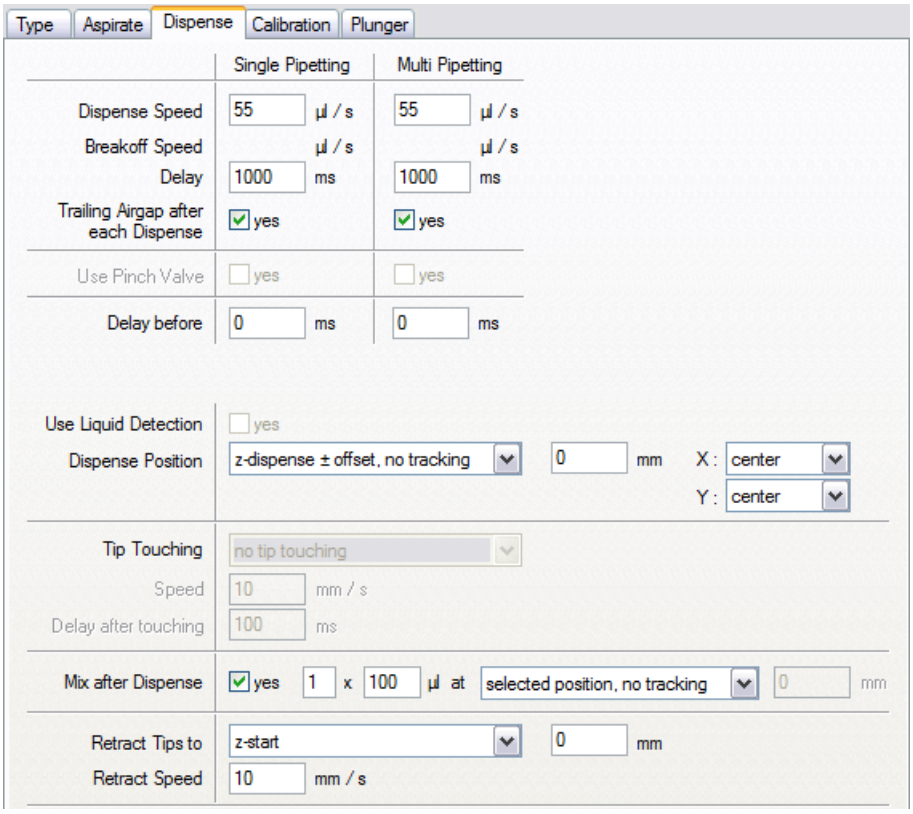


Fig. 10-19 *Te-MO 384 Dispense parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Delay before

Specify the required settling time for the Te-MO after completing the previous Te-MO command and before starting to dispense (range: 0 to 5000 ms).

The Te-MO 384 does not support liquid level detection or tip touching for dispensing.

See 10.5.2 “Te-MO 96 Dispense Parameters”, 🗎 10-35 for details of the other parameters.

10.6.3 Te-MO 384 Calibration Parameters

Freedom EVOware uses these parameters for the 384-tip Te-MO pipetting head to ensure that the specified net volumes are dispensed accurately. The two curves in the dialog box show graphically the current settings for single pipetting mode and multi pipetting mode.

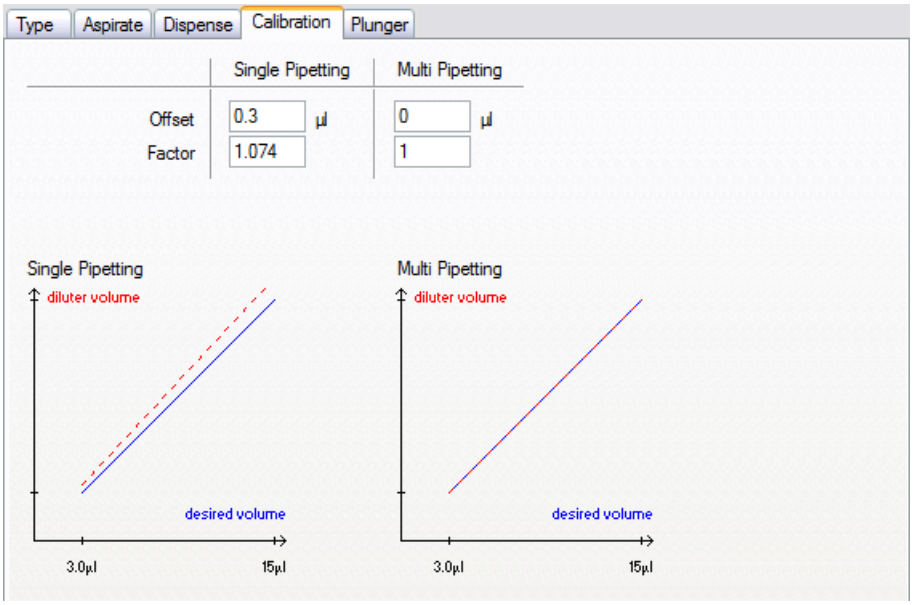


Fig. 10-20 *Te-MO 384 Calibration parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Offset / Factor

Specify an offset and/or calibration factor to be applied for single pipetting mode and multi pipetting mode.

Freedom EVOware uses the following expression to calculate the Te-MO plunger movement from the net volume specified in the pipetting script:

Calibrated Te-MO plunger movement = (net volume * factor) + offset

10.6.4 Te-MO 384 Plunger Parameters

Freedom EVOware uses these parameters for the 384-tip Te-MO pipetting head to control the plunger during dispensing. The graph illustrates the plunger speed versus the time for the specified dispense volume.

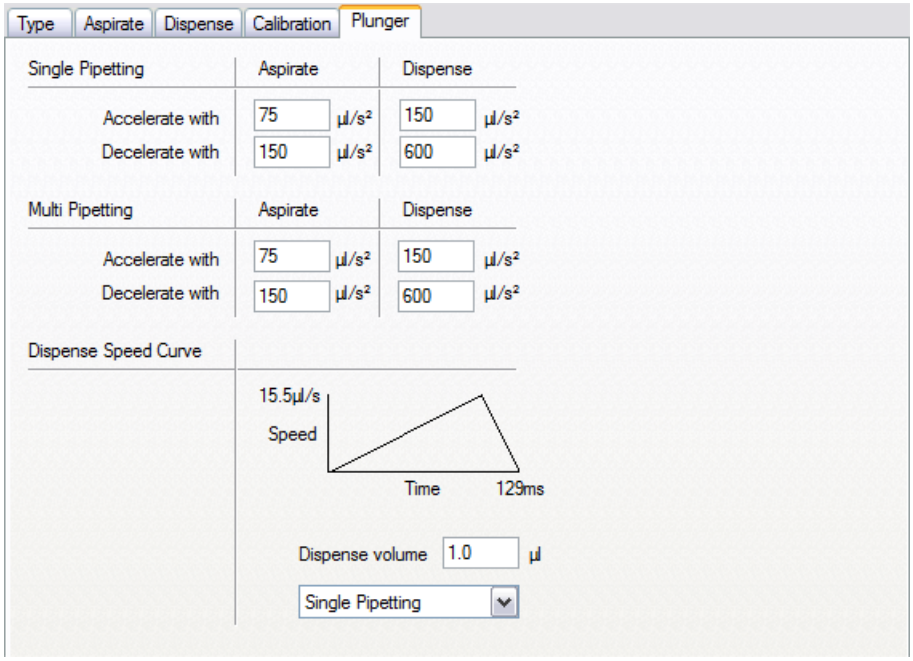


Fig. 10-21 *Te-MO 384 Plunger parameters*

The parameters of this dialog box are as follows (some of the parameters must be specified separately for single pipetting mode and multi pipetting mode):

Accelerate with / Decelerate with

Specify the required acceleration and deceleration of the Te-MO plunger for single pipetting mode and multi pipetting mode. For mechanical reasons the Te-MO plunger cannot accelerate or decelerate instantly. The graph then illustrates the plunger speed versus the time for the specified dispense volume.

Dispense volume

Specify the dispense volume for which you want to see a graph (the volume you specify should include the leading and trailing airgaps) and choose the graph you want to see (single pipetting mode or multi pipetting mode). The volume you specify is only used to calculate the graph and is not a dispense command for the Te-MO (the volume which will be dispensed is specified with the Te-MO Dispense command).

The graph helps you to identify whether you have chosen suitable settings in this dialog box.

If the graph has a flat top (plateau), the plunger acceleration/deceleration will allow the plunger to reach the dispense speed specified on the Dispense tab of the liquid class for the dispense volume you have chosen.

10.7 Overview of Liquid Classes Supplied With Freedom EVOware

A liquid class is a collection of parameters necessary for pipetting liquids. Each liquid class is divided into subclasses for a certain hardware configuration and volume range. The subclasses are automatically selected at runtime depending on the used hardware and required volume.

10.7.1 General

Tecan provides a default liquid class database for water, DMSO, serum and ethanol, installed with EVOware. Additional liquid classes for special pipetting options can be imported from the EVOware CD.

Note: *If not specified, all liquid classes are for use with 1000 µl syringes.*

Using a standard liquid class assumes that the most suitable tip size is used; for example, when pipetting 150 µl with the Liquid Handling Arm, it is assumed that the 200 µl tip is used. In this case, the standard liquid class "Water free dispense" should be used. However, if it is preferred to use the 1000 µl tip for pipetting 150 µl, a specific liquid class should be used, in this case "Water free dispense DiTi 1000" .
The diagram Fig. 10-23, 10-43 and Fig. 10-22, 10-42 show the usage for the most common liquid classes in combination of the required volume and tip capacity.

Eg.: Pipetting a volume of 10 µl with a 50 µl tip using the MCA384 would require the liquid class **Water wet contact MCA 384 DiTi 50**.

Liquid class usage for DiTi operated with the LiHa:

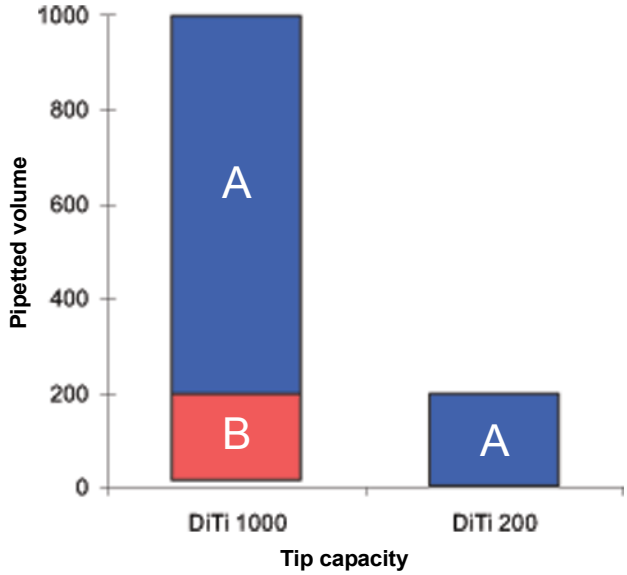


Fig. 10-22 *Liquid class usage for Disposable Tips on the LiHa*

A *Water free dispense* ***B*** *Water free dispense DiTi 1000*

Liquid class usage for DiTi operated with the MCA384:

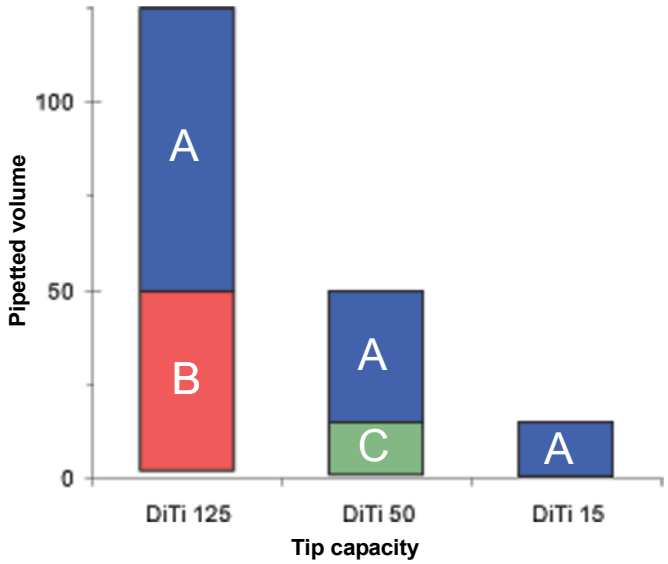


Fig. 10-23 *Liquid class usage for Disposable Tips on the MCA 384*

A *Water wet contact*
B *Water wet contact MCA 384 DiTi 125*
C *Water wet contact MCA 384 DiTi 50*

Approach

The liquid class names have been chosen to be self-explanatory containing the liquid type, dispense mode and if necessary the hardware configuration.

Many liquid classes may have similar parameter settings when being compared to each other. The differences are usually found in adaptations of parameter values for certain volumes.

Refer to the respective section for further information:

10.7.3 “Installed Liquid Classes”, 10-44
10.7.4 “Liquid Classes on the Freedom EVOware CD”, 10-49

10.7.2 Dispense Modes

The figures below show how liquids are dispensed into a well.
The dispense modes differ from each other to provide certain features to match the liquid’s attributes and application requirements.

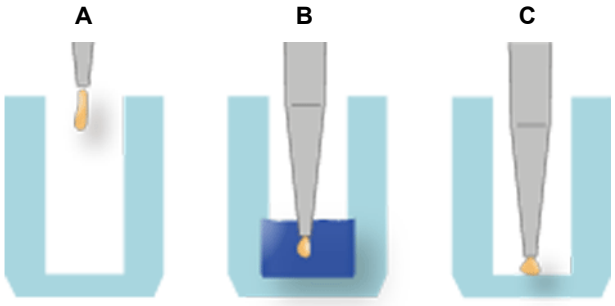


Fig. 10-24 *Dispense modes*

A *Free Dispense (non contact)*
B *Wet Contact (contact with liquid)*
C *Dry Contact (contact with labware)*

Free Dispense (non contact)

The free dispense mode dispenses the liquid from a defined dispense position, generally at the container top. If liquid is present the dispense position is above the liquid level.

– Medium precision; maximum throughput

Wet Contact (contact with liquid)

The wet contact dispense mode dispenses the liquid at Z-Max or below the liquid level of a pre-dispensed liquid (e.g. diluent). Mixing can be added without additional tip movement.

– High precision; low throughput

Dry Contact (contact with labware)

The dry contact dispense mode dispenses at or close to Z-Max.

High precision; medium throughput

10.7.3 Installed Liquid Classes

The default liquid classes listed below are intended for water, DMSO, serum and ethanol.

DMSO

Name	**DMSO free dispense**
Usage	General liquid class
Devices	LiHa, MCA96 with DiTi
Comment	Can be used for most pipetting devices and tip types

Name	**DMSO wet contact**
Usage	General liquid class
Devices	MCA96, MCA384, Te-MO96
Comment	For multi channel pipetting heads

Name	**DMSO wet contact MC96 HP block**
Usage	High Precision fixed tip block on 96-channel pipetting heads
Devices	MCA96, Te-MO96
Comment	

Name	**DMSO wet contact MCA 384 DiTi 125**
Usage	
Devices	MCA384 with 125 µl DiTi
Comment	Improved accuracy below 50 µl

Name	**DMSO wet contact MCA 384 DiTi 50**
Usage	
Devices	MCA384 with 50 µl DiTi
Comment	Improved accuracy below 15 µl

Name	**DMSO wet contact MCA 384 large capacity tip block**
Usage	For large capacity fixed tip blocks
Devices	MCA384 with 96 or 384 fixed tip block
Comment	

Name	**DMSO wet contact MCA 384 small capacity tip block**
Usage	For small capacity fixed tip blocks
Devices	MCA384 with 96 or 384 fixed tip block
Comment	

Ethanol

Name	**Ethanol free dispense**
Usage	General liquid class
Devices	LiHa
Comment	

Serum

Name	**Serum free dispense**
Usage	General liquid class
Devices	LiHa
Comment	

Name	**Serum free dispense DiTi 1000**
Usage	
Devices	LiHa with 1000 µl DiTi
Comment	Improved accuracy below 200 µl with 1000 µl DiTi

System Liquid

Name	**System Liquid free dispense**
Usage	Aspirate and dispense system liquid with the LiHa
Devices	LiHa
Comment	

Water

Name	**Water dry contact High density plate**
Usage	For Te-PS tips and 10 µl Disposable Tips in dry 1536 well plate
Devices	LiHa with Te-PS tips or 10 µl DiTi
Comment	

Name	**Water free dispense**
Usage	General liquid class
Devices	LiHa, MCA96
Comment	For most pipetting devices and tip types

Name	**Water free dispense DiTi 1000**
Usage	
Devices	LiHa with 1000 µl DiTi
Comment	Improved accuracy below 200 µl for 1000 µl Disposable Tips

Name	**Water wet contact**
Usage	General liquid class
Devices	LiHa, MCA384, MCA96, Te-MO 96
Comment	For most pipetting devices and tip types

Name	**Water wet contact MC96 HP block**
Usage	High Precision fixed tip block on 96-channel pipetting heads
Devices	MCA96, Te-MO 96
Comment	

Name	**Water wet contact MCA 384 DiTi 125**
Usage	
Devices	MCA384 with 125 µl DiTi
Comment	Improved accuracy below 50 µl

Name	**Water wet contact MCA 384 DiTi 50**
Usage	
Devices	MCA384 with 50 µl DiTi
Comment	Improved accuracy below 15 µl

Name	**Water wet contact MCA 384 large capacity tip block**
Usage	For large capacity fixed tip blocks
Devices	MCA384 with 96 or 384 fixed tip block
Comment	

Name	**Water wet contact MCA 384 small capacity tip block**
Usage	For small capacity fixed tip blocks
Devices	MCA384 with 96 or 384 fixed tip blocks
Comment	

Wash Refill Center

The WRC wash and refill center has default liquid classes, required for washing tips. The WRC wash and refill center is used for washing the MCA96, MCA384 as well as the Te-MO 96.

WRC

Name	**WRC step 1 Empty tips**
Usage	Step 1 of wash command
Devices	MCA384, MCA96, Te-MO 96
Comment	For emptying tips

Name	**WRC step 2 Dip in**
Usage	Step 2 of wash command
Devices	MCA384, MCA96, Te-MO 96
Comment	For dipping into the wash liquid

Name	**WRC step 3 Blow out underwater**
Usage	Step 3 of wash command
Devices	MCA384, MCA96, Te-MO 96
Comment	For blowing out air inside the wash liquid

10.7.4 Liquid Classes on the Freedom EVOware CD

The liquid classes listed below can be imported from the Freedom EVOware CD.

LiHa 50 µl DiTi

Name	**Water free dispense DiTi 50**
Usage	For 50 µl DiTi without filter
Devices	LiHa with 50 µl DiTi
Comment	Used with 500 µl syringe

Name	**Water free dispense DiTi 50 Filter**
Usage	For 50 µl DiTi with filter
Devices	LiHa with 50 µl DiTi
Comment	Used with 500 µl syringe

Te-MO 384

Name	**384 DMSO contact wet**
Usage	
Devices	Te-MO 384
Comment	

Name	**384 DMSO free dispense**
Usage	
Devices	Te-MO 384
Comment	

Name	**384 Dummy**
Usage	
Devices	Te-MO 384
Comment	Only used for maintenance scripts

Name	**384 Water contact wet**
Usage	
Devices	Te-MO 384

Comment	

Name	**384 Water free dispense**
Usage	
Devices	Te-MO 384
Comment	

PMP

Name	**Water free dispense PMP DiTi 200 filter**
Usage	Pressure Monitored Pipetting using Tecan part no. 10 612 553
Devices	PMP LiHa with 200 µl DiTi with filter
Comment	

Name	**Water free dispense PMP DiTi 1000 filter**
Usage	Pressure Monitored Pipetting using Tecan part no. 10 612 555
Devices	PMP LiHa with 1000 µl DiTi with filter
Comment	

Name	**Serum free dispense PMP DiTi 200 filter**
Usage	Pressure Monitored Pipetting using Tecan part no. 10 612 553
Devices	PMP LiHa with 200 µl DiTi with filter
Comment	

Name	**Serum free dispense PMP DiTi 1000 filter**
Usage	Pressure Monitored Pipetting using Tecan part no. 10 612 555
Devices	PMP LiHa with 1000 µl DiTi with filter
Comment	

Name	**DMSO free dispense PMP DiTi 200**
Usage	Pressure Monitored Pipetting using Tecan part no. 10 612 552
Devices	PMP LiHa with 200 µl DiTi without filter
Comment	

Name	**DMSO free dispense PMP DiTi 200 filter**
Usage	Pressure Monitored Pipetting using Tecan part no. 10 612 553
Devices	PMP LiHa with 200 µl DiTi with filter
Comment	

Name	**DMSO free dispense PMP DiTi 1000 filter**
Usage	Pressure Monitored Pipetting using Tecan part no. 10 612 555
Devices	PMP LiHa with 1000 µl DiTi with filter
Comment	

Name	**Template free dispense PMP DiTi 200**
Usage	Template for creating a customized PMP liquid class
Devices	PMP LiHa with 200 µl DiTi without filter
Comment	

Name	**Template free dispense PMP DiTi 200 filter**
Usage	Template for creating a customized PMP liquid class
Devices	PMP LiHa with 200 µl DiTi with filter
Comment	

Name	**Template free dispense PMP DiTi 1000 filter**
Usage	Template for creating a customized PMP liquid class
Devices	PMP LiHa with 1000 µl DiTi with filter
Comment	

11 Getting Started - Setting Up a New Script or Process

This chapter describes the steps which are required to set up a new pipetting script (Freedom EVOware Standard) or process (Freedom EVOware Plus). Processes and scripts can only be created and/or modified by users with Freedom EVOware Administrator or Application Specialist rights.

11.1 First Steps

Freedom EVOware Standard

Start Freedom EVOware and choose *Create a new script* in the Startup Wizard (see 5.2 “Startup Wizard, Freedom EVOware Standard”, 🗎 5-5). This opens the main window of Freedom EVOware. Initially, the Worktable Editor at the bottom right of the screen will be empty (i.e. it does not contain any carriers or labware etc.). The Script Editor at the top right of the screen will also empty be until you add some pipetting commands. Until you save the script for the first time and assign a name of your choice, the title bar of the Script Editor will show a generic name.

Freedom EVOware Plus

Start Freedom EVOware and choose *Create a new process* in the Startup Wizard (see 5.3 “Startup Wizard, Freedom EVOware Plus”, 🗎 5-7). This opens the main window of Freedom EVOware. Initially, the Worktable Editor at the bottom right of the screen will be empty (i.e. it does not contain any carriers or labware etc.). The Process Editor at the top right of the screen will also empty be empty until you add some process steps. Until you save the script for the first time and assign a name of your choice, the title bar of the Process Editor will show a generic name.

The various elements of the Freedom EVOware main window are described in 5.4 “Overview of the Main Window in Freedom EVOware”, 🗎 5-9.

11.2 Setting Up a New Pipetting Instrument

Please proceed as follows when setting up a new pipetting instrument:

- Use the *Setup & Service* software to check and calibrate the reference coordinates of the hardware. This is normally done for you by the Tecan Field Service Engineer when installing the pipetting instrument and the optional devices. See 1.2 “Reference Documents”, 🗎 1-3 for information on this software.
- Edit the settings for the LiHa (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 🗎 8-22).
- If necessary, edit the settings for the PosID barcode scanner (see 8.4.2.2, 🗎 8-28), the MPO/LICOS system (see 8.4.2.3, 🗎 8-29), the Chemical System (see 8.4.2.5, 🗎 8-30) and the doorlocks (see 8.4.2.7, 🗎 8-31).

11.3 Pre-requirements

Before you can set up a process or script, you have to configure the infrastructure of your system as follows:

- Check that the optional devices you want to use (such as barcode scanners) are installed on your pipetting instrument and that the devices are present in the Control Bar (Commands section) and/or visible in the Worktable Editor. If the icons are missing, then you need to run the installation program again and install the device drivers which are missing (see 13.2 “Overview of Device Commands”, 🗎 13-12 and 4.3 “Modifying, Removing or Repairing Your Installation”, 🗎 4-8). In general, the device drivers are pre-configured during installation with appropriate global settings. For information on configuring the global settings see 8.4 “Device Settings”, 🗎 8-21.
- Check that the general settings for the Freedom EVOware software are configured appropriately (see 8 “Configuration Tool”, 🗎 8-1). Among other things, check that the COM ports have been configured for the optional devices and that the I/O state is switched ON for the devices that you want to use (this enables the COM interface for the respective device). See 8.4.3.1 “I/O State Tab”, 🗎 8-36.
- Check that the carriers and labware you want to use for your process are visible in Freedom EVOware in the Control Bar (Labware section). If you are using custom carriers and/or labware items which are not in the list, you need to create them in Freedom EVOware before you can set up your process. See 9.5 “Configuring Carriers”, 🗎 9-39 and 9.4 “Configuring Labware”, 🗎 9-15. In the case of carriers, this involves e.g. specifying the carrier dimensions and how many labware items can be put on the carrier. In the case of labware, this involves e.g. specifying the labware dimensions.
- Check that liquid classes are available for the liquids you want to pipette (see 10.1 “Liquid Classes Editor”, 🗎 10-1). A liquid class is a set of liquid handling parameters. It specifies aspirating and dispensing speeds, airgaps, liquid detection modes, etc.
- Rectangular labware such as microplates is moved to and from carriers and other devices such as carousels using a plate robot (RoMa; robot manipulator). Tubes are moved to and from tube racks using a tube robot (PnP; Pick & Place arm). Movement commands for the RoMa and PnP are called robot vectors. The robot vectors for the RoMa are associated with the carrier definitions. The robot vectors for the PnP are associated with the labware definitions. Appropriate robot vectors may already be provided with your Freedom EVOware installation. Check in the respective carrier and labware definitions to see whether the robot vectors you want to use are already present. Otherwise you will need to configure a new vector. See 9.6 “Creating and Editing Plate Robot Vectors”, 🗎 9-55 and 9.7 “Creating and Editing Tube Robot Vectors”, 🗎 9-63.
- Additional RoMa and PnP vectors are needed to move the RoMa or PnP back to a home (or parking) position when not in use. Such vectors can be seen in the Robot Vectors section of the Control Bar. See 9.6.4 “Defining the Home Position for a RoMa”, 🗎 9-62 and 9.7.4 “Defining the Home Position for a PnP”, 🗎 9-69 for more information.

11.3.1 Setting Up Carriers on the Worktable

The Worktable Editor at the bottom right of the screen is a graphical representation of the pipetting instrument's worktable (deck). It shows icons for

the devices which are installed and the arrangement of the carriers and labware. See 13.2 “Overview of Device Commands”, 13-12.

Before programming your process or pipetting script, you need to move the carriers and labware etc. which you want to use on to the Worktable Editor to match the real arrangement of these objects on the pipetting instrument.

This section describes how to add carriers; putting labware on the carriers is described in 11.4.1 “Choosing Labware for a Pipetting Script”, 11-4, 11.5.1 “Choosing Labware for a Process”, 11-7 and 11.5.4 “Choosing Labware for a Pipette Command”, 11-11.

Note: *Each script or process has its own worktable layout, and the worktable layout is automatically saved with the script or process. Click on the worktable and click Save worktable as template if you want to save the worktable layout as a template for use in another script or process. The worktable template contains information on the carriers you have chosen. If you have already put labware onto the carriers, the template also contains information on the labware you have chosen.*

Carriers can only be placed on the Worktable Editor at specified grid positions which correspond to the positioning pins on the instrument’s worktable. One grid unit is 25.0 mm. The choice and the positions of carriers and labware are chosen according to the requirements of your application or experiment.

You can change the carrier positions later by dragging with the mouse without needing to change your script or process, for example if it turns out that the carriers are too close together to position additional objects in between.

You can change the size of the Worktable Editor by moving the mouse over the one of the edges until the double arrow cursor appears. Then click and drag until the required size has been reached.

When required by the script or process, Freedom EVOware uses the RoMa (Robot Manipulator) to move labware during runtime to new positions (carrier sites). However, carriers and devices always stay at the same position. Accordingly, you must set up the initial worktable with all of the carriers you need in the correct positions.

There are two basic types of carrier - normal carriers on which you can place labware for pipetting and carriers which are devices. The latter type are used as placeholders on the worktable for devices such as the orbital shaker or the incubator. Depending on the type of device, such carriers are often not available for pipetting, even though you can place labware on (or into) them. When the carrier is configured, this is specified by unchecking the *Accessible for liquid handling arm* checkbox.

To create the worktable layout, select the required carrier type from the Control Bar (Labware section) and drag it onto the worktable at the required position. Make sure that there is enough space on the worktable for the carrier. If necessary, drag already positioned objects to the left or right to make space. Remember that the final positions you choose must correspond to the actual position of the objects on the pipetting instrument. Large objects such as the Te-MO need a lot of space to allow them to be positioned.

Repeat this process to add all of the carriers to the worktable that you need. The choice and the positions of the carriers is based on the requirements of your application or experiment.

To move a carrier to a new position, click the edge of the carrier to select it and drag it to the required position. When dragging the carrier, the current grid position is shown in the small yellow tab at the bottom left. To delete a carrier, click on it and drag it off of the worktable.

To make a copy of a carrier which is already on the worktable, press the Ctrl button, click on the carrier and drag the cursor to the required grid position.

When adding, deleting or moving carriers, a special cursor is shown to indicate the action you are performing (“+”, “del” or “move”).

If you click on a carrier (click on the edge, not on the labware on the carrier), information on the carrier is shown in the lower infopad.

Carrier types can be assigned unique colors in the Freedom EVOware configuration make it easier for you to identify them in the Worktable Editor (see “Color”, 9-41).

Carriers which are designed for one type of labware only (such as tube racks and the wash station) are put on the worktable with a full complement of labware. For other carrier types, you need to add the labware by hand (see later).

See also 11.7.2 “Example of a Worktable With Several Carriers and Labware Items”, 11-20.

11.4 Setting Up a Pipetting Script in Freedom EVOware Standard

After setting up the worktable with the carriers and devices you want to use, before you write the pipetting script you must to choose the labware you need.

11.4.1 Choosing Labware for a Pipetting Script

Select the required labware type from the Labware section of the Control Bar and drag it onto the required carrier site on the worktable. To help you, Freedom EVOware highlights all carrier sites which are suitable for the chosen labware item.

Note: *If you click on the carrier and scroll down to Allowed Labware, Freedom EVOware will show you the labware types which are compatible with the selected carrier.*

Repeat this process to add all of the labware to the worktable that you need. The choice and the positions of the labware is based on the requirements of your application or experiment.

To move labware to a new position, click on the labware to select it and drag to the required carrier site.To delete labware, click on it and drag it off of the worktable.

To make a copy of a labware item which is already on the worktable, press the Ctrl button, click on the labware and drag the cursor to the required carrier site.

When adding, deleting or moving labware, a special cursor is shown to indicate the action you are performing (“+”, “del” or “move”).

Labware types can be assigned unique colors in the Freedom EVOware configuration make it easier for you to identify them in the Worktable Editor (see “Color”, 9-19).

In addition, labware items can be assigned labels (names) to make it easier to identify them in the Worktable Editor (see 11.7.1 “Assigning a Label (Name) to the Labware”, 11-19). Labware labels are shown in yellow.

If you click on a labware item, information on the item is shown in the lower infopad. See Fig. 11-8, 11-20 for an example of a worktable.

11.4.2 Creating a Pipetting Script

The pipetting program (or *script*) is created by choosing script commands in the Control Bar and dragging them to the Script Editor window (see 5.4.4 “The Script Editor”, 5-19). See 13.1 “Overview of Script Commands”, 13-1.

Because Freedom EVOware normally executes a script in a linear sequence, you should add the commands in the order that you want the script to be executed. Each script is associated with its own worktable layout (carriers, devices and labware), which must be specified before you write the script.

When you drag a script command to the Script Editor, a blue line helps you to choose where the new command should be inserted.

When you drop the command onto the Script Editor, a dialog box is opened where you can specify the command parameters. After making your entries, click *OK* to add the command to the script. To change the command parameters later, double-click the script line to open the dialog box again (or click on the script line and press Enter).

If your script uses device commands, it is also necessary to put labware of the correct type onto the device icon(s). This is shown by a grey rectangle inside the icon. This is not necessary in Freedom EVOware Plus. Tip: If you click on the grey rectangle, the chosen labware type is shown in the lower Infopad.

The currently selected script line is highlighted in orange. The associated object in the Worktable Editor is highlighted using the same color. The cursor keys can be used to move through the script one line at a time.

The *Cut*, *Copy*, and *Paste* functions in the *Edit* menu (and in the Script Editor’s context menu) can also be used when creating a script. Select one or more script lines, choose *Cut* or *Copy*, select where you want to insert the command(s) and then choose *Paste*.

To select several script lines, click on the first line you want to select and shift-click on the last line (click while pressing the Shift key). To clear the selection, click on a line outside of the selected range. To move a line, click on it and drag it to the required position.

See also 17 “Special Features, Example Scripts and Processes,”, 17-1.

11.4.2.1 Checking the Pipetting Script for Errors

Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors and shows all commands which have errors in red. If you select a faulty command, the infopad will show information on the error. Double-click on the command in the Script Editor to open a dialog box where you can change the command parameters.

Choose Auto-Validation in the Edit menu if you want to switch off automatic validation of pipetting scripts (see 6.2.5 “Auto-Validation”, 6-9). You then need to validate the script manually (by choosing Validate Script in the Edit menu).

If your script contains conditional jumps or branches, validation only checks those parts of the script which are executed with the default values of the IF variables in Condition commands. For this reason, it is not recommended to declare variables (e.g. with the Set Variable command) within conditional parts of the script (see 14.1.12 “Validating a Script Which Contains Variables”, 14-18).

If your script contains conditional jumps or branches, you should separately validate those parts of the script which are not executed with the default values of the IF variables. To do this, temporarily modify the values of the IF variables to ensure that all of the script branches have been tested.

Freedom EVOware chooses multi-dispensing mode automatically if the pipetting script specifies an aspirate command followed by several consecutive dispense commands. In turn, this influences the liquid class parameters which are used.

The decision between single dispensing mode and multi-dispensing mode is made when the script is validated and not when the script is run. Scripts are validated when they are modified and also when they are opened for running without being modified. Validation is done using default values for the variables. If the number of consecutive dispense commands is controlled by a variable whose value can change during runtime, it is recommended to design the script with branches or separate groups of commands for single-pipetting mode (one dispense operation) and multi-pipetting mode (more than one dispense operation). This ensures that the correct pipetting mode and liquid class parameters will be chosen at runtime.

See also 14.3.4 “Validating a Script Which Contains Sub-Routines”, 🗎 14-22.
See also C “Validation of Freedom EVOware Applications”, 🗎 C-1.

11.4.3 Adding Robot Movement Commands to the Script

Plate Robot

Movement commands for the plate robot (RoMa vectors) are associated with carriers. They are specified in the carrier definition (see 9.6 “Creating and Editing Plate Robot Vectors”, 🗎 9-55).

In Freedom EVOware Standard, RoMa movements are initiated by script commands (see 15.58 “RoMa Vector Command”, 🗎 15-141 and 15.59 “Transfer Labware Command”, 🗎 15-143). Simple RoMa movements are carried out with the Move RoMa command, which does not need a RoMa vector (see 15.57, 🗎 15-140).

For Freedom EVOware Plus see 11.5.3 “Adding Robot Movement Commands to the Process”, 🗎 11-10.

Tube Robot

Movement commands for the tube robot (PnP vectors) are associated with labware such as tube racks. They are specified in the labware definition (see 9.7 “Creating and Editing Tube Robot Vectors”, 🗎 9-63).

In both Freedom EVOware Standard and Freedom EVOware Plus, PnP movements are initiated by script commands (see 15.61 “PnP Vector Command”, 🗎 15-146, and 15.62 “Transfer Tube Command”, 🗎 15-148). Simple PnP movements are carried out with the Move PnP command, which does not need a PnP vector (see 15.60, 🗎 15-145).

In Freedom EVOware Plus, you first must use a special process step to open the script editor (see 16.25.1 “Tube Robot - ExecuteScript Command”, 🗎 16-83).

Multi channel arm (MCA)

Movement commands for the MCA96 or the MCA384 (MCA vectors) are associated with carriers. They are specified in the carrier definition (see 9.8 “Creating and Editing MCA Vectors”, 🗎 9-69). MCA vectors are very similar to RoMa vectors.

In Freedom EVOware Standard, MCA movements are initiated by script commands (see 15.68.11 “MCA96 Vector Command”, 🗎 15-175, 15.68.12 “MCA96 Transfer Labware Command”, 🗎 15-177, 15.69.11 “MCA384 Vector Command”, 🗎 15-199 and 15.69.12 “MCA384 Transfer Labware Command”, 🗎 15-201). Also see 9.8 “Creating and Editing MCA Vectors”, 🗎 9-69.

For Freedom EVOware Plus see 11.5.3 “Adding Robot Movement Commands to the Process”, 🗎 11-10.

11.4.4 Saving the Script

Save the script you have created by clicking Save in the toolbar or by choosing Save from the File menu. Then enter a name for the script in the Save File dialog

box or select an existing script which you want to overwrite and click the green arrow. You can also save the script as a script template by choosing Save As from the File menu and clicking the Template button in the Save File dialog box.

11.4.5 Running the Script

See 12.1 “Running a Liquid Handling Script”, 12-1.

11.4.6 Example Scripts and Example Process

Freedom EVOware is provided with a number of example scripts which illustrate various aspects of script programming. It is instructive for new users of Freedom EVOware to load the scripts which are provided and to study each command while looking at the on-line help. For learning purposes, some of the scripts can also be run in offline mode. The scripts are stored as script templates. To load them, click New and select the required template. Script templates have a yellow icon.

Note that scripts will indicate errors (marked in red in the Script Editor) if the configuration of the pipetting instrument is unsuitable. For example, if the script uses DITIs, errors which be shown if the liquid handling arm is not configured with DITIs. Conversely, if the liquid handling arm is configured with DITIs, Aspirate commands must be preceeded by Get DITI commands. Errors will also be shown if the script uses liquid classes or volume ranges which are not currently available.

In many cases, the purpose of each of the scripts is explained in a Comment command at the start of the script.

The Freedom EVOware installation contains a number of maintenance scripts (see 6.4.2 “Run Maintenance”, 6-10). Maintenance scripts can be run by both Freedom EVOware versions but can only be created and edited with Freedom EVOware Standard. Script files and maintenance scripts have a green icon.

Freedom EVOware Plus is also provided with an example process template, which is for the ELISA test (Enzyme immunoassay). Process templates have a blue icon.

11.5 Setting Up a Process in Freedom EVOware Plus

In Freedom EVOware Plus, the sequence of steps which are required to carry out a particular application or experiment, for example to extract the substance you are looking for, is called a process. The process specifies the operations you want the pipetting instrument to execute. Processes are set up in the Process Editor, which is shown at the top right of the screen (see 5.4.3 “The Process Editor (Freedom EVOware Plus)”, 5-17).

11.5.1 Choosing Labware for a Process

After setting up the worktable with the carriers and devices you want to use, you then need to choose the labware you need. There are several ways to do this depending on the situation:

⌦ The labware will always stay at the same position and does not need to be moved when you run the process

This option is typically used for reagent troughs.
Select the required labware type in the Control Bar (Labware section) and drag it onto the required carrier site on the worktable. To help you, Freedom EVOware highlights all carrier sites which are suitable for the chosen labware item.

Note: *If you click on the carrier and scroll down to Allowed Labware, Freedom EVOware will show you the labware types which are compatible with the selected carrier.*

Repeat this process to add all of the labware to the worktable that you need. The choice and the positions of the labware is based on the requirements of your application or experiment.
To move labware to a new position, click on the labware to select it and drag to the required carrier site.To delete labware, click on it and drag it off of the worktable.
To make a copy of a labware item which is already on the worktable, press the Ctrl button, click on the labware and drag the cursor to the required carrier site.
When adding, deleting or moving labware, a special cursor is shown to indicate the action you are performing (“+”, “del” or “move”).
Labware types can be assigned unique colors in the Freedom EVOware configuration make it easier for you to identify them in the Worktable Editor (see “Color”, 🗎 9-19).
In addition, labware can be assigned labels (names) to make them easier to identify in the Worktable Editor (see 11.7.1 “Assigning a Label (Name) to the Labware”, 🗎 11-19). The label is shown in yellow.
If you click on a labware item, information on the item is shown in the lower infopad.

⌦ You want to create a repository of labware in a feeder device such as a carousel

Before you run a process which contains a pipetting script, you must put all of the labware on the worktable that the pipetting script will need. You also need to tell Freedom EVOware how many labware items you will be using. When you run the process, Freedom EVOware will take labware items from the feeder device as and when needed by the pipetting script and move them using the RoMa to the empty carriers which you have put aside for the pipetting operations.
Proceed as follows to create a labware repository in a feeder device: Select the required labware type in the Control Bar (Labware section) and drag it onto the icon for the carousel (or another feeder device or a hotel) in the Worktable Editor.
This opens the Labware Generator dialog box, which allows you specify how many labware items you need. See 11.6 “Labware Generator (Freedom EVOware Plus)”, 🗎 11-16.
The Labware Generator will insert a labware source icon in the Process Editor.
Notes:

- The chosen number of labware items is shown in the carousel device icon (see Fig. 11-8 “Example worktable showing carriers, labware and labware labels”, 🗎 11-20).
- Repeat the above procedure to create additional labware source icons if the carousel will be filled with different labware types in different towers.
- The number of towers and the storage capacity of the feeder device are configured in the Edit Carrier dialog box for the feeder (see 9.5, 🗎 9-39). See also 9.5.5.3 “Carousel Carrier Attributes”, 🗎 9-50 and 16.33 “Commands for the Te-Stack Te-MO”, 🗎 16-105.

⌦ You want to create a repository of labware on the worktable

This option is only used for special applications; labware repositories (storage areas) are normally created in feeder devices.

Before you run a process which contains a pipetting script, you must put all of the labware on the worktable that the pipetting script will need. You may decide to use, say, the left side of the worktable as a storage area for all of the labware which you will need and the right side of the worktable for pipetting. You also need to tell Freedom EVOware how many labware items you will be using. When you run the process, Freedom EVOware will take the required labware items from the storage area when needed by the pipetting script and move them using the RoMa to the carrier sites which you have chosen to use for the pipetting operations.

Proceed as follows to create a labware repository on the worktable: Make sure that you have already put enough carriers in the Worktable Editor, select the required labware type in the Control Bar (Labware section), press Ctrl and drag the labware icon onto one of the carriers in the Worktable Editor.

This opens the Labware Generator dialog box, which allows you specify how many labware items you need and which carriers to place them on. See 11.6 “Labware Generator (Freedom EVOware Plus)”, 🗎 11-16.

The Labware Generator will insert a labware source icon in the Process Editor.

⌦ The labware will be used dynamically by a pipetting script

When you run a process with a pipetting script, Freedom EVOware Plus will take the required labware items from the storage device or storage area when needed by the pipetting script and move them using the RoMa to the carrier sites which you have chosen to use for the pipetting operations. Labware which is used dynamically by the pipetting script should be positioned in the Worktable Editor when you create the script. See 11.5.4 “Choosing Labware for a Pipette Command”, 🗎 11-11.

Note: *Labware which you position when the Script Editor is open is shown in grey when you return to the Process Editor. This is because it is only moved to the pipetting position during process runtime and is initially kept elsewhere (typically in a carousel).*

11.5.1.1 Labware in the Worktable Editor of Freedom EVOware Plus

In the figure below, the labware on sites 1 and 2 of the first carrier (at grid position 2) will always stay at the same position. The labware was dragged from the Control Bar to the carrier directly.

Sites 1 and 2 of the second carrier (at grid position 10) are used as a labware repository. The labware was dragged from the Control Bar to the carrier while pressing the Ctrl button to open the Labware Generator.

Sites 1 and 2 of the third carrier (at grid position 18) show (in grey) labware which will be used dynamically by a pipetting script and will be moved to this position during process runtime. The labware was dragged from the Control Bar to the carrier when the Script Editor was open.

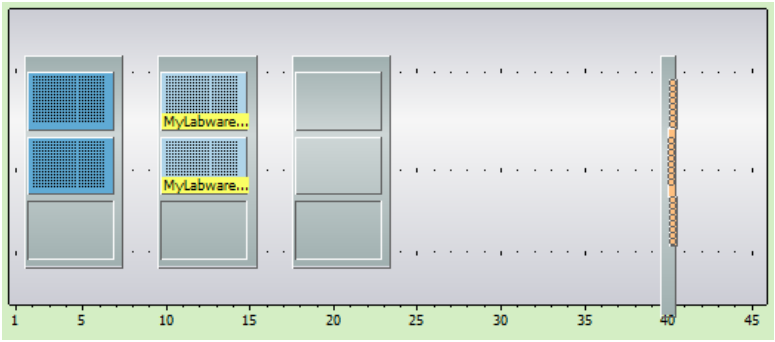


Fig. 11-1 *Labware in the Worktable Editor of Freedom EVOware Plus*

See Fig. 11-8, 🗎 11-20 for a worktable example where the labware is taken from a carousel.

11.5.2 Adding Device Commands to the Process

To add a device command to your process, click the Commands tab in the Control Bar, look for the device you want to use and drag the command from the Control Bar onto the Process Editor window. If you need to specify any execution parameters for the command, the Parameters dialog box will open automatically when you do this. For example, the MoveToCartridge command for the Carousel requires you to specify the number of the required tower. The Pipette command of the Liquid Handling Arm requires you to specify a pipetting script.

The device command is then shown as a process step icon in the Process Editor.

You can change the position of a process step icon by dragging it to the required location.

To edit the execution parameters of the command (or the pipetting script) later, double-click on the icon (or right click on the icon and choose Edit Parameters). The Parameters dialog box will only be shown if the command has parameters.

To edit the runtime parameters for the command, right click on the icon and choose Adjust Time/Error handling. See 9.10.2 “Adjust Time/Error handling”, 🗎 9-71. These parameters are set automatically to appropriate values and do not normally need to be changed.

To edit the pre-actions and post-actions for the command, right click on the icon and choose Pre-actions / Post-actions. See 9.10.3 “Pre-actions / Post-actions (Custom)”, 🗎 9-72. The pre-actions and post-actions are normally configured through the global settings of the device driver and only need to be changed for special applications.

To delete a process step, select the icon and press Del (or right click on the icon and choose Delete in the context menu).

11.5.3 Adding Robot Movement Commands to the Process

Plate Robot

Movement commands for the plate robot (RoMa vectors) are associated with carriers. They are specified in the carrier definition (see 9.6 “Creating and Editing Plate Robot Vectors”, 🗎 9-55).

In Freedom EVOware Plus, RoMa vectors are mainly used by pre-actions and post-actions of device commands. The pre-actions and post-actions and thus the RoMa movements are executed automatically when the process step is executed. If your process involves pipetting to a plate which is initially stored in a carousel, Freedom EVOware first uses the robot vector associated with the carousel to take the plate from the carousel and then uses the robot vector associated with the carrier to put the plate on the carrier. You do not need to specify the RoMa vectors - Freedom EVOware gets them from the carrier and device definitions. You only need to make sure that the RoMa vectors which you want to use are already set up in the Freedom EVOware configuration.

Tube Robot

Movement commands for the tube robot (PnP vectors) are associated with labware such as tube racks. They are specified in the labware definition (see 9.7 “Creating and Editing Tube Robot Vectors”, 🗎 9-63).

In both Freedom EVOware Standard and Freedom EVOware Plus, PnP vectors are executed using script commands (see 15.61 “PnP Vector Command”, 🗎 15-146, and 15.62 “Transfer Tube Command”, 🗎 15-148). Simple PnP movements are executed with the Move PnP command, which does not need a PnP vector (see 15.60, 🗎 15-145).

In Freedom EVOware Plus, you first must use a special process step to open the script editor (see 16.25.1 “Tube Robot - ExecuteScript Command”, 🗎 16-83).

Multi channel arm (MCA)

Movement commands for the MCA96 or the MCA384 (MCA vectors) are associated with carriers. They are specified in the carrier definition (see 9.8 “Creating and Editing MCA Vectors”, 🗎 9-69).

11.5.4 Choosing Labware for a Pipette Command

Script (e.g. pipetting) commands are carried out by the liquid handling arm and are defined in the Script Editor. To open the Script Editor, select the Pipette command in the Control Bar (Liquid Handling Arm group) and drag it to the Process Editor window.

Before you can specify script commands such as Aspirate or Dispense, you must put the labware you want to use onto the carriers. When you run the process, Freedom EVOware Plus will take the specified labware items from the storage device or storage area as and when needed and move them using the RoMa to the carrier sites which you allocated for the pipetting operations.

Select the required labware type from the Labware section of the Control Bar and drag it onto the required carrier site on the worktable (you cannot choose sites which are already occupied by labware). To help you, Freedom EVOware highlights all carrier sites which are suitable for the chosen labware item.

Note: *If you click on the carrier and scroll down to Allowed Labware, Freedom EVOware will show you the labware types which are compatible with the selected carrier.*

Repeat this process to add all of the labware to the worktable that you need. The choice and the positions of the labware is based on the requirements of your application or experiment.

To move labware to a new position, click on the labware to select it and drag to the required carrier site.To delete labware, click on it and drag it off of the worktable.

To make a copy of a labware item which is already on the worktable, press the Ctrl button, click on the labware and drag the cursor to the required carrier site.

When adding, deleting or moving labware, a special cursor is shown to indicate the action you are performing (“+”, “del” or “move”).

Labware can be assigned unique colors in the Freedom EVOware configuration make it easier for you to identify them in the Worktable Editor (see “Color”, 🗎 9-19).
In addition, labware can be assigned labels (names) to make them easier to identify in the Worktable Editor (see 11.7.1 “Assigning a Label (Name) to the Labware”, 🗎 11-19). The label is shown in yellow.
If you click on a labware item, information on the item is shown in the lower infopad.

Note: *Labware which you position when the Script Editor is open is shown in grey when you return to the Process Editor. This is because it is only moved to the pipetting position during process runtime and is initially kept elsewhere (typically in a carousel).*

Since the labware is only moved to the pipetting position during process runtime, if your process has more than one pipetting script you can specify the same carrier sites for pipetting operations in different scripts. The carrier sites you choose are used as placeholders. When you run the process, Freedom EVOware Plus may decide to use different sites to maximize the throughout (efficiency) of the process.
See Fig. 11-8, 🗎 11-20 for an example of a worktable.

11.5.5 Creating a Script for the Pipette Command

Script (e.g. pipetting) commands are carried out by the liquid handling arm and are defined in the Script Editor (see 5.4.4 “The Script Editor”, 🗎 5-19). To open the Script Editor, select the Pipette command in the Control Bar (Liquid Handling Arm group) and drag it to the Process Editor window.
The pipetting script is then created by choosing script commands in the Control Bar and dragging them to the Script Editor window.

Note: *In Freedom EVOware Plus, when the Script Editor is open the Commands tab of the Control Bar only shows script commands (commands which are used for writing pipetting scripts). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices).*

The procedure to follow to create a script is the same for Freedom EVOware Plus and Freedom EVOware Standard See 11.4.2 “Creating a Pipetting Script”, 🗎 11-5 for more information.
See also 13.1 “Overview of Script Commands”, 🗎 13-1.

11.5.6 Closing the Script Editor

When you have finished adding all of the script commands you need, click Accept at the top right of the Script Editor window to return to the Process Editor. This stores the script in memory and creates a Pipette process step icon. To permanently save the script you must save the process as described in 11.5.10 “Saving the Process”, 🗎 11-15.
Click Reject if you do not want to keep the changes you have made to the script. Click Save as template if you want to save the script as a template for use in another process or process step.

Labware which you positioned when the Script Editor was open is shown in grey when you return to the Process Editor. When you run the process, Freedom EVOware Plus will move the labware to these carrier sites automatically.

If your process uses more than one pipetting script, insert another Pipette command in your process using the procedure described above.

To edit an existing pipetting script, double-click the Pipette process step to open the Script Editor again. Alternatively, select the Pipette process step and click Edit Parameters in the Infopad.

11.5.7 Adding Final Position Icons to your Process

Final position icons are used to specify the final position of the labware after the process has finished. They are often associated with a storage device such as a hotel. Final position icons are not necessary if you want Freedom EVOware to return the labware to its original position after the process has finished, for example back to a storage device such as a carousel (the “base” location). Final position icons are created by right-clicking on the background of the Process Editor and choosing Choose Final Position from the context menu.

11.5.8 Linking the Process Steps in the Order of Execution

After adding all of the process steps you need in the Process Editor, you must specify the order in which you want to execute them by linking the icons together.

Start by clicking the pointed end of a labware source icon. Then drag and drop the arrow cursor which appears onto the labware field (“object parameter”) of the first process step that will handle this labware. A connecting line will be drawn from the labware source icon to the process step to visualize the connection and the default labware name “MP” in the labware field changes to the labware name of the source labware (e.g. “sample_1”).

If the process step can handle more than one labware item at a time (for example if the LiHa command needs two microplates), repeat this process to connect more labware source icons to the labware fields.

Then drag the next process step to be adjacent or close to the first process step and link them together in the same way. Click the black arrow on the labware field of the first process step and drag and drop the arrow cursor onto the labware field of the second process step.

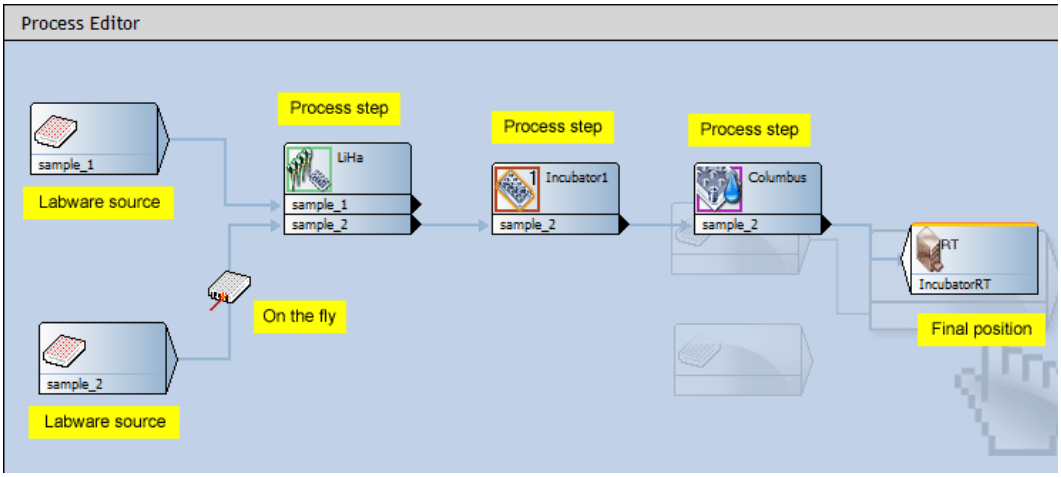


Fig. 11-2 *Process Editor showing process icons*

Proceed until you have connected all of your process steps in the order you want.

Note: *You cannot save the process until you have connected all of the process steps (Freedom EVOware will display an error message).*

Note: *If you make a mistake when connecting the process steps or change your mind, right-click on the connecting line and choose Delete.*

Note: *Make sure that the labware source icons and labware fields which you connect together use the same physical labware type. For example, do not connect a labware source icon for a microplate to a labware field for a deep well plate. Freedom EVOware does not check the labware types when you make the connections. However, you are allowed to connect landscape and portrait versions of the same physical labware together (e.g. 96 Well Microplate and 96 Well Microplate portrait). In this case, Freedom EVOware will automatically use the RoMa to rotate the labware by 90° if necessary.*

11.5.8.1 Reserving and Linking Devices

Some process steps, typically initialize or prime commands for devices, do not need labware and do not have labware fields. In such cases, click the right edge of the process step and drag and drop the arrow cursor onto the icon of the following process step:

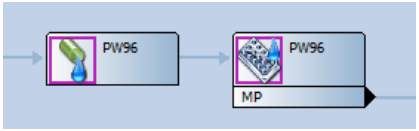


Fig. 11-3 *Linking a process step which does not have a labware field*

In the above example, the connecting line makes sure that priming takes place before the plate washer is used to wash the plate.

This type of connection can also be used to reserve a device. In the following example, a magnetic separation is carried out using the Te-MagS and a pipetting operation is then carried out. The plate is then returned to the Te-MagS for another separation step. The line linking the two Te-MagS process steps makes

sure that the Te-MagS is reserved and thus immediately available for use when the pipetting operation has finished:

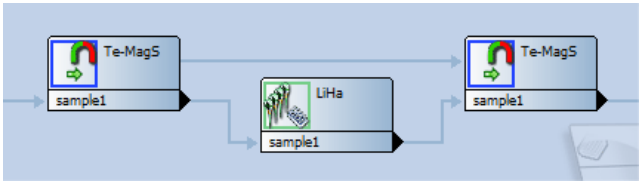


Fig. 11-4 *Reserving a device*

Freedom EVOware Plus lets you run several processes in parallel. If you don't reserve the Te-MagS, it may be occupied by another process when the first process wants to use it. The first process will then have to wait until it becomes free again. Depending on your application or experiment, the waiting may be inacceptable.

11.5.9 Adding On-the-fly Actions

Some devices require the use of the RoMa (plate robot) to carry out their function. A typical example of this is the Symbol LS-1220 barcode scanner which is rigidly fixed to the instrument's deck and cannot move towards the labware to scan it. Instead, the RoMa is used to move the labware past the barcode scanner "on-the-fly" while carrying out something else, for example when moving the labware from one carrier to another. The barcode scanner is then instructed to perform a read operation when the RoMa presents the labware. Such devices are called on-the-fly devices.

Add an on-the-fly device to your process by dragging it from the Control Bar onto the line which links two process steps. The corresponding actions will then be executed when the labware moves between the two process steps.

For example, If you want to read the barcodes of your labware items as they move from the washer to the pipetting station, drag the Barcode Scanner device onto the line which links these two process steps.

See Fig. 5-11 "Process Editor showing an example process", 🗎 5-17.

11.5.10 Saving the Process

Save the process you have created by clicking Save in the toolbar or by choosing Save from the File menu. Then enter a name for the process in the Save File dialog box or select an existing process which you want to overwrite and click the green arrow. You can also save the process as a process template by choosing Save As from the File menu and clicking the Template button in the Save File dialog box.

11.5.11 Running the Process

See 12.2 "Running and Optimizing a Process (Freedom EVOware Plus)", 🗎 12-5.

11.6 Labware Generator (Freedom EVOware Plus)

The labware generator is used to specify the type and quantity of labware items which you will need for the pipetting script commands in your process (LiHa Pipette process steps).

11.6.1 Creating a labware repository in a feeder device

Select the required labware type in the Control Bar (Labware section) and drag it onto the icon for the feeder device (e.g. carousel) in the Worktable Editor. If the chosen labware type is allowed for the feeder device, this opens the labware generator dialog box:

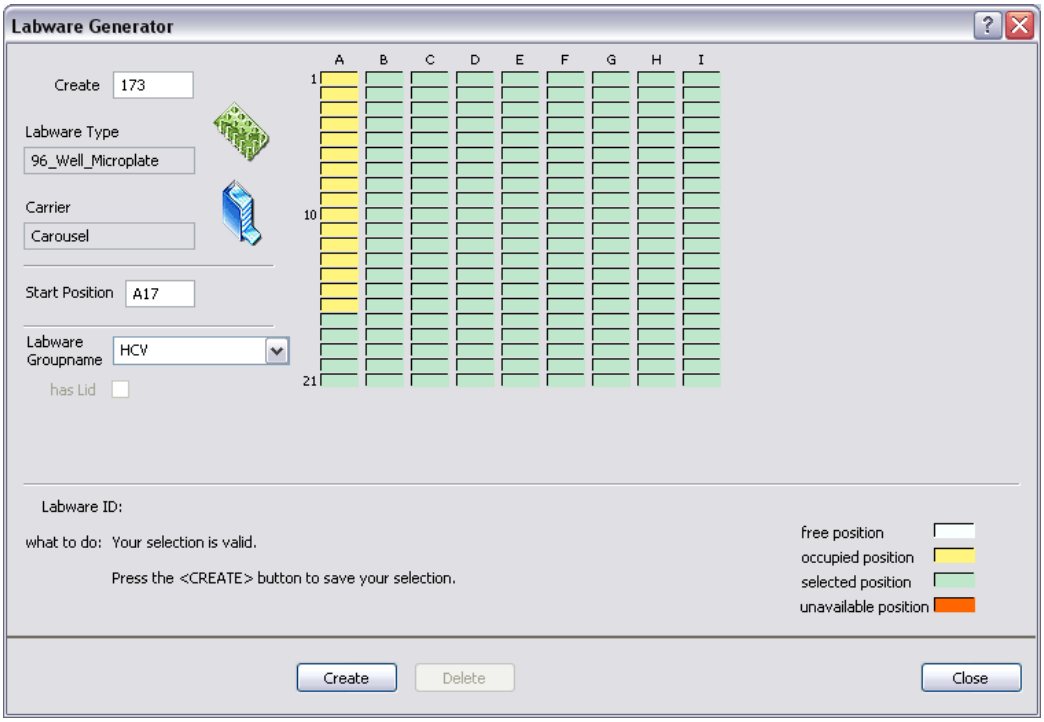


Fig. 11-5 *Labware generator when generating labware for the carousel*

The rectangles at the top of the dialog box show all of the labware storage positions (sites) in the feeder device. For the carousel or Te-Stack stacker, each column is one tower (cartridge).

The number of towers and the storage capacity of the feeder device are configured in the Edit Carrier dialog box for the feeder (see 9.5, 🗎 9-39). See also 9.5.5.3 “Carousel Carrier Attributes”, 🗎 9-50 and 16.33 “Commands for the Te-Stack Te-MO”, 🗎 16-105.

Storage positions which are yellow (occupied) or red (unavailable) cannot be used for generating labware since they are already in use.

Enter the number of labware items you want to create in the Create field and click on the first site you want to use. The message area at the bottom of the labware generator will tell you if sufficient sites are available for the chosen number of items. Adjust your entries until the labware generator indicates that your selection is valid and click Create to create the specified labware. The newly created

labware changes colour from green (selected position) to yellow (occupied position). This creates a labware group (a set of labware associated with a labware source icon in the Process Editor).

If you move the cursor over the coloured rectangles, the Labware ID field shows the ID (internal labware name) of the selected labware item. If you click on a labware item (yellow rectangle), the starting position and the name of the associated labware group are shown. Click Delete if you want to delete all of the labware in the group.

Right click a labware item to open the context menu (see 11.6.3 “Context Menu of the Labware Generator”, 11-19).

Repeat this process if you want to create further labware of a different type or using a different group name (i.e. an additional labware source icon).

Click Close when you have created all of the labware you need. This closes the labware generator. The labware you have created is shown as one or more labware source icons in the Process Editor and the total number of storage positions containing labware is shown in the icon for the feeder device.

Note: *When the Process Editor is open, right-click on the icon for the feeder device and choose Modify Labware in the context menu if you want to subsequently edit the settings you have made.*

11.6.2 Creating a labware repository on the worktable

This option is only used for special applications; labware repositories are normally created in feeder devices such as the carousel.

Make sure that you have already put enough carriers in the Worktable Editor, select the required labware type from the Control Bar (Labware section), press Ctrl and drag the labware icon onto a suitable carrier type in the Worktable Editor. This opens the labware generator dialog box:

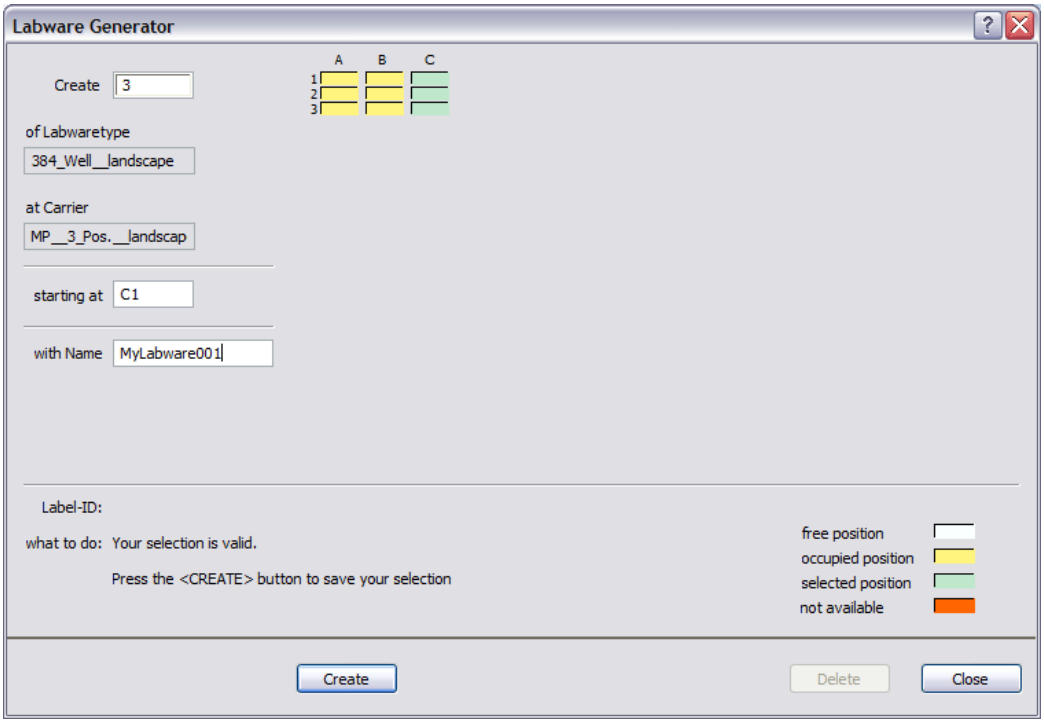


Fig. 11-6 *Labware generator when generating labware for three microplate carriers on the worktable*

The rectangles at the top of the dialog box show the sites of all of the suitable carriers on the worktable. Sites marked *occupied* or *not available* cannot be used for generating labware since they are already in use. If you have already created a pipetting script, sites which are used by the pipetting script must not be used either. Freedom EVOware will put the labware onto these sites during process runtime, and they must not be occupied by a labware repository.

Note: *Labware which you position when the Script Editor is open is shown in grey when you return to the Process Editor.*

Note: *Carrier sites which are used for a labware repository cannot be used in your script for pipetting. Make sure you have kept enough unused sites for your pipetting script. Put another carrier on the worktable if necessary.*

Enter the number of labware items you want to create in the Create field and click on the first site you want to use. The message area at the bottom of the labware generator will tell you if sufficient sites are available for the chosen number of items. Adjust your entries until the labware generator indicates that your selection is valid and click Create to create the specified labware. The newly created labware changes colour from green (selected position) to yellow (occupied position). This creates a labware group (a set of labware associated with a labware source icon in the Process Editor).

If you move the cursor over the coloured rectangles, the Labware ID field shows the ID (internal labware name) of the selected labware item. If you click on a labware item (yellow rectangle), the starting position and the name of the associated labware group are shown. Click Delete if you want to delete all of the labware in the group.

Right click a labware item to open the context menu (see 11.6.3 “Context Menu of the Labware Generator”, 11-19).

Click Close when you have created all of the labware you need. This closes the labware generator. The labware you have created is shown as a labware source icon in the Process Editor and is also visible on the worktable.

Note: *When the Process Editor is open, right-click on the generated labware and choose Modify Labware in the context menu if you want to subsequently edit the settings you have made.*

If you use labware barcodes to specify source and/or destination positions in the worklist, do not use a labware repository on the worktable if the labware will be moved during runtime to another worktable position for pipetting. This can lead to pipetting at the wrong worktable position. Use a labware repository in a feeder device (e.g. hotel or carousel) instead.

11.6.3 Context Menu of the Labware Generator

Right click a labware item (yellow rectangle) in the labware generator to open the context menu. The menu item are as follows:

Enter barcode

Choose this option to enter a barcode manually for the selected labware item. This option is mainly used for testing since it is inflexible in a production environment to store barcodes within the process. You should normally use a barcode scanner instead.

Read barcodes from file

Choose this option to import a list of barcodes for the selected labware group. This feature is mainly intended for testing or training. For information on the syntax see A.2.4 “Barcode File for the Labware Generator”, A-14.

Rename labware

Choose this option to change the name of the labware group.

Delete labware

Choose this option to delete all of the labware in the group.

11.7 Additional Information on Labware and Carriers

11.7.1 Assigning a Label (Name) to the Labware

You can assign a label (i.e. a user-defined name) to each labware item by double clicking on the labware in the Worktable Editor and typing the required name in the Name field of the Edit Labware Name dialog box:

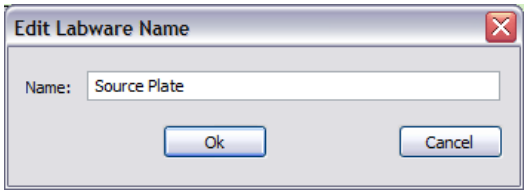


Fig. 11-7 *Specifying labels for objects on the worktable*

The label is shown in yellow. The label for the currently selected labware item is also shown in the Infopad together with the other properties.

Labware labels can be used in scripts and worklist files to make them easier to understand for other persons (see 15.24 “Worklist Command”, 15-36). They are also used by Freedom EVOware in log files. If you don’t specify labware labels, the scripts, worklists and log files contain the generic labware name instead, e.g. *Microplate, landscape*.

11.7.2 Example of a Worktable With Several Carriers and Labware Items

The following figure shows an example worktable with carriers, labware and labware labels:

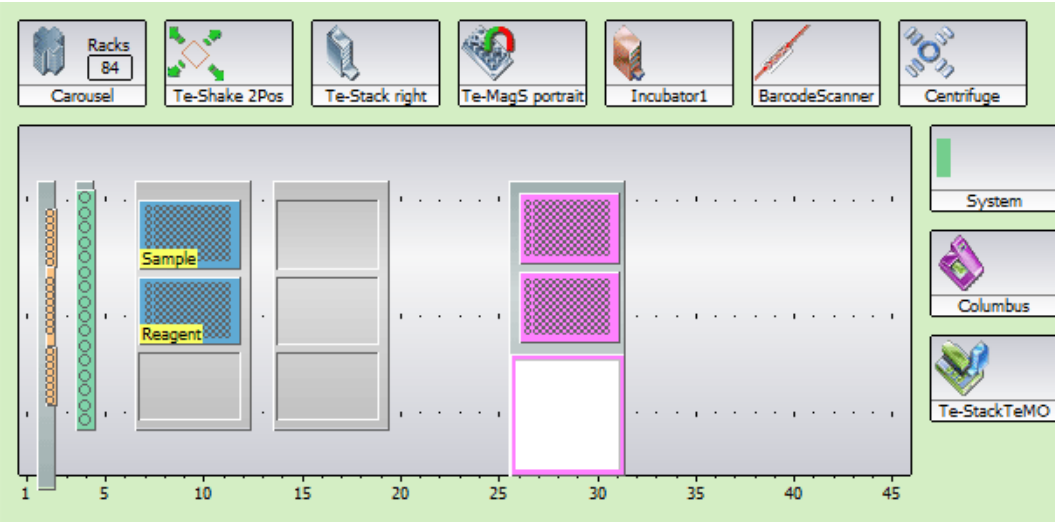


Fig. 11-8 *Example worktable showing carriers, labware and labware labels*

In this example, the labware generator was used to assign 84 microplates to the carousel.

11.7.3 System Liquid Icon

When you specify a script command which involves aspiration, click on the System icon at the bottom right of the Worktable Editor if you want to aspirate the system liquid. If you need to aspirate large volumes of the system liquid, this avoids having to place a trough on the worktable. See 8.4.2.5 “System Liquids”, 8-30 for further information.

12 Running Scripts and Processes

This chapter describes how to run, preview and calibrate a process (Freedom EVOware Plus) and how to run a script (Freedom EVOware Standard).

12.1 Running a Liquid Handling Script

This section describes how to run a liquid handling script.

Freedom EVOware Standard

To run the currently loaded script, click the Run button in the toolbar or choose Run in the Execute menu. To run another, previously saved script click the Wizard button in the toolbar or choose Startup Wizard in the File menu. Then choose the script you want to run.

Freedom EVOware Plus

To run a script which belongs to a process, open the Script Editor by double-clicking the Pipette command which is associated with the script and click the Run button in the toolbar or choose Run in the Execute menu.

After a short delay you are shown the Runtime Controller dialog box:

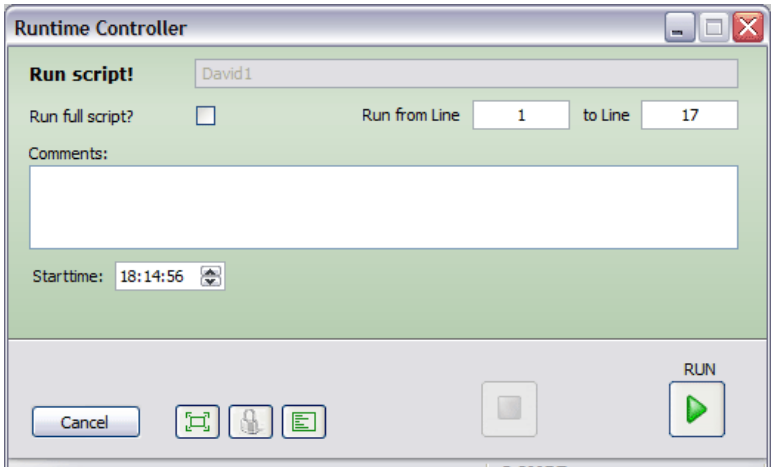


Fig. 12-1 *Script runtime settings*

Click the **Run** button to run the script. Unless you are running Freedom EVOware in offline mode, commands will be sent to the pipetting instrument and pipetting will take place according to the instructions in your script.

The **Run** button will change to **Recover** if the script did not execute completely the last time it was run (see 17.2 “ Script and process recovery function”, 17-5).

Run full script?

To start running the script at a specified line, e.g. for testing purposes, uncheck this checkbox and specify the script lines which you want to run by entering the first and last script line. Then click the Run button.

This option is not available when running a script in in Freedom EVOware Plus.

If you start running the script at a specified line and if the part of the script which you have chosen to run uses variables which have not been defined, you will be prompted to enter the values manually.

Start time

Specify when you want to start the script. Initially, this field shows the current time (i.e. start the script immediately).

A progress bar shows the progress of the script as it runs:

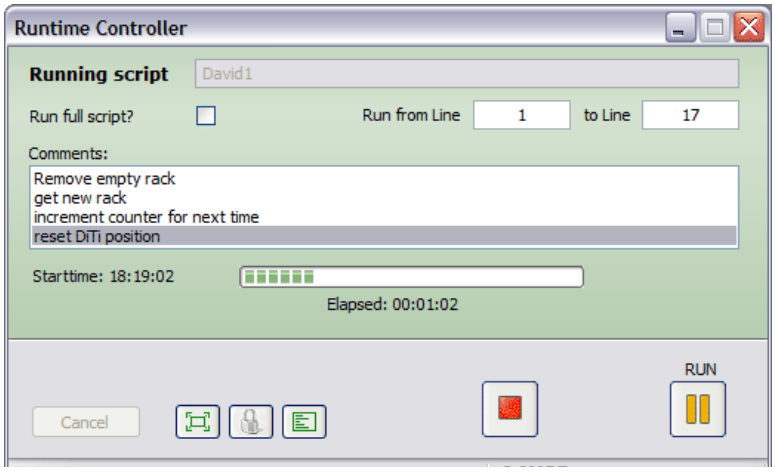


Fig. 12-2 *Script runtime showing progress bar*

To **pause** a running script, click the *Pause* button (orange parallel bars). The script is paused and the System paused message is shown.

To resume running a script which has been paused, click the *Run* button again.

To **stop** the script from running, click the *Stop* button (red square).

If the pipetting script contains Comment commands, the comments are shown in the Comments panel in the center of the dialog box (example: see figure above). If suitable comments have been chosen, this can help the instrument operator to monitor the progress of the script as it runs.

The other options in this dialog box are as follows:

Start time

This shows the time when the script was started.

Elapsed

The amount of time which has elapsed since the script was started.

12.1.1 Buttons in Standard View

Cancel

Return to the Script Editor.

Extended view

Switch to the extended view of the Runtime Controller where you can get more information on the currently running script.

Lock Freedom EVOware

This button logs out the current Freedom EVOware user (see 6.1.9 “Lock EVOware”, 🗎 6-7). Another use of the Lock button is to switch Freedom EVOware users when you are handing over to another employee, e.g. due to a change of shift.

Show Log File

This button displays the Freedom EVOware log file in a new window. The log file tracks every command sent by the computer to the instrument, every response returned from the instrument to the computer and any user input. The content and format of the log corresponds to a log file of type LOG (see A.1 “Overview of the Log Files”, 🗎 A-1).

If the script finished with warnings or errors, click this button to get more information from the log file.

Stop

This button stops the script.

Run

This button runs the script; it is also used to continue the script if it has been paused.

Pause

This button pauses the script.

12.1.2 Runtime Controller, Extended View (Running a Script)

The Extended View option of the runtime controller gives you more information on the currently running pipetting script:

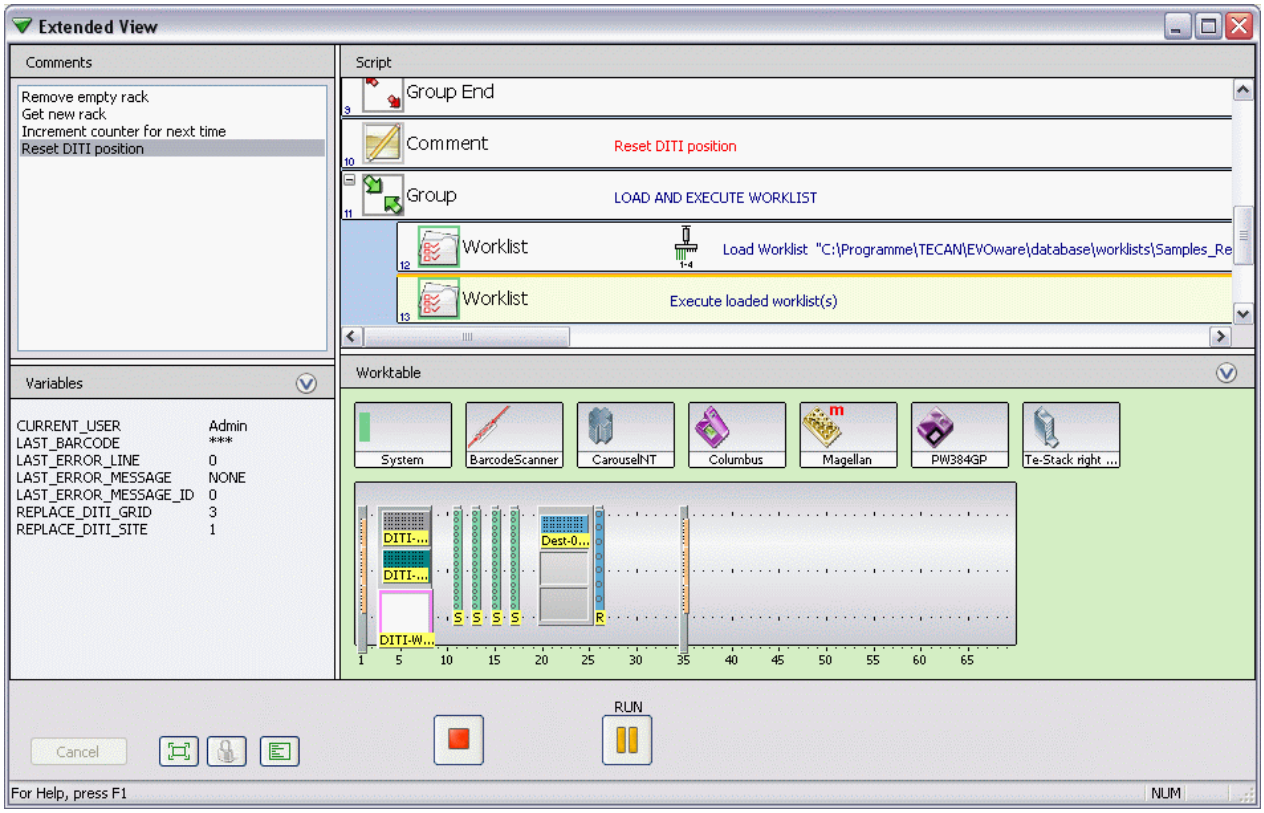


Fig. 12-3 *Script runtime - Extended view*

The extended view has four windows:

- The **Comments window** - If the pipetting script contains Comment commands, this window shows the comments. This window is refreshed after executing each script line.
- The **Variables window** - This shows the value of all defined variables during script runtime. This window is refreshed after executing each script line.
- The **Script window** - This shows part of the script. When the script is running, the script line which is currently executing is highlighted with a colored line. The default color is orange.
- The **Worktable window** - This shows the instrument's worktable. When the script is running, the worktable object (e.g. microplate) which is currently being accessed is highlighted with a colored box. The default color is orange.

If you need more space for the Script window, you can collapse the Worktable window by clicking in the title bar. You can also resize the windows by dragging the dividers between the windows.

12.1.3 Buttons in Extended View

Cancel
Return to the Script Editor.

Standard view
Return to the standard view of the Runtime Controller.

Lock Freedom EVOware
This button logs out the current Freedom EVOware user (see 6.1.9 “Lock EVOware”, 6-7). Another use of the Lock button is to switch Freedom EVOware users when you are handing over to another employee, e.g. due to a change of shift.

Show Log File
This button displays the Freedom EVOware log file in a new window. The log file tracks every command sent by the computer to the instrument, every response returned from the instrument to the computer and any user input. The content and format of the log corresponds to a log file of type LOG (see A.1 “Overview of the Log Files”, A-1).

If the script finished with warnings or errors, click this button to get more information from the log file.

Stop
This button stops the script.

Run
This button runs the script; it is also used to continue the script if it has been paused.

Pause
This button pauses the script.

12.2 Running and Optimizing a Process (Freedom EVOware Plus)

This section describes how to run, preview and calibrate a process.

To run the currently loaded process, click the Run button in the toolbar or choose Run in the Execute menu. To run another, previously-saved process click the Wizard button in the toolbar or choose Startup Wizard in the File menu. Then click *Run an existing process* and choose the process you want to run.

Freedom EVOware allows you to run several processes in parallel or sequentially. You can save all of the runtime settings for one or more processes as a “method”. For information on creating and running methods see the description of the *Save as method* button, below.

After a short delay you are shown the Runtime Controller dialog box:

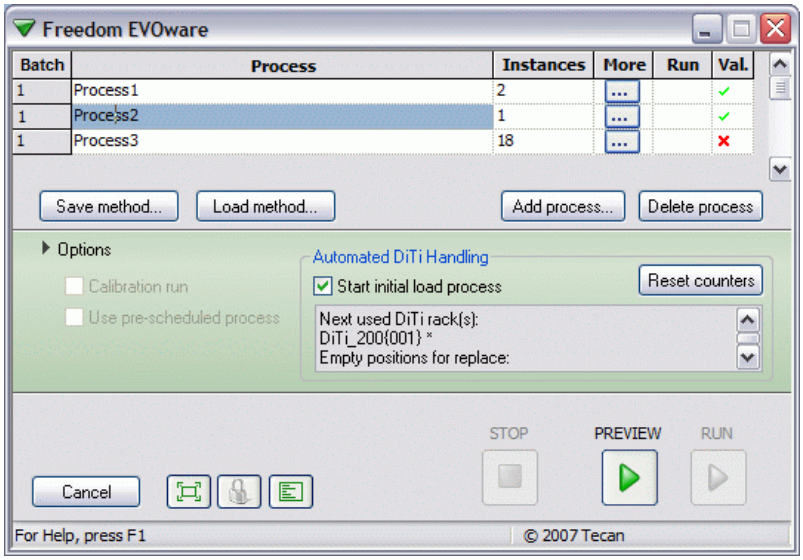


Fig. 12-4 *Process runtime settings*

To run the process, click the **Run** button at the bottom right of the dialog box. Unless you are running Freedom EVOware in offline mode, commands will be sent to the pipetting instrument and pipetting will take place according to the instructions in your process.

The **Run** button will change to **Recover** if the script did not execute completely the last time it was run (see 17.2 " Script and process recovery function", 17-5).

Click the **Preview** button to run the process for testing without carrying out pipetting. Firmware commands such as movement commands are not sent to the pipetting instrument.

Process List

Freedom EVOware Plus allows you to run several processes in parallel or sequentially. You can run several copies of the same process and/or several different processes. You can also add new processes to processes which are already running. The process list shows the processes you have set up to run.

Batch

Read-only field. If you want to run more than one process type, you can assign batch numbers if you want them to group the processes into batches which run sequentially rather than in parallel. See 12.2.2 "Additional Runtime Settings for Processes", 12-10 for information on using batches.

Process

The name of the process.

Instances

Specify how many times you want to run the process in parallel. To optimize the throughput (efficiency) of your pipetting instrument (i.e. to maximize the number of samples which are processed per hour), Freedom EVOware Plus allows you to run several copies of the same process in parallel. This allows Freedom EVOware to e.g. to fetch a microplate from the carousel while pipetting is taking place on another microplate. Each copy of the process is called an instance.

The maximum value you should set for this parameter depends e.g. on how much space you have assigned on the worktable for Freedom EVOware to set up multiple sites for pipetting. There is no speed advantage to be gained in fetching a microplate from the carousel if there are currently no unoccupied carrier sites where it can be put down.

More

Click ... to specify additional runtime settings. See 12.2.2 “Additional Runtime Settings for Processes”, 12-10.

Run

Freedom EVOware allows you to start one or more additional processes when other processes are already running. For example, if you have forgotten to start a process which you need. To use this feature, add the process as described in *Add process*, below. If other processes are already running, the Run column in the runtime list will now contain a small Run button for the new process. Click this button when you are ready to start the new process.

Val.

A green tick (“validated”) shows that enough labware has been assigned to the process. A red cross shows that process validation was not successful, for example because not enough labware is available for the specified number of instances or the same labware has been assigned to two different processes (invalid assignment).

Buttons

Save method

Save all of the settings you have made in the Runtime Controller as a “method”. If you have configured to run several processes, the saved method will contain the runtime settings you have made for all of the processes.

To run a previously-saved method, click the Wizard button in the toolbar or choose Startup Wizard in the File menu. Then click *Run an existing process* and choose the method you want to run (the lists shows both processes and methods).

Load method

Load a previously saved method file. You can then run the method and/or edit the method and save it again.

Add process

To add another process to the runtime list, click Add process and select the process from the dialog box. The dialog box only lists processes which use the same worktable layout. You cannot add processes which use a different worktable layout. If the original process was saved in a user defined directory (see 6.1.3 “Save”, 6-5, User Defined), the dialog box only lists processes which use the same worktable layout AND have been saved in the same base directory.

Delete process

Click this button to delete the currently selected process from the runtime list. You can only delete a process with this button if it is not yet running.

Options

Click **Options** to show additional options:

Calibration run

Check this checkbox if you want to run the process and carry out pipetting for the purpose of calibration. You only need to run one process instance for the calibration run. The following options (buttons) are available in the Runtime Controller when the calibration run has finished:

Click **Update Proc** to store information in the process file on the actual times required by device commands. The next time you run the process, the stored information allows the scheduler to plan more accurately and thus optimize the throughput of the process.
Click **Optimize** to optimize the schedule using the real execution times which were recorded during the calibration run. You must then click Save to save the optimized schedule.
Click **Save Schedule** to save a schedule for this process. Schedules can be used to ensure that processes always run the same way and use the same timing.

The calibration run allows Freedom EVOware to get realistic execution times for each of the process steps which are more accurate than the estimated values in the database. This generally results in better optimization (throughput) of the process. The Calibration run option is not available if you run several different processes in parallel.

Use pre-scheduled process

Check this checkbox if you want to run the process using a schedule which you saved previously, for example after carrying out a calibration run. A separate schedule can be saved for each of the processes you have run.

If you run the process using a saved schedule, it will always run the same way and use the same timing. If you don't use a saved schedule and you have chosen to run more than one instance of the process, the order of the process steps may change each time you run the process if the time required for certain operations such as robot movements varies slightly from run to run.

Automated DiTi Handling panel

The options in this panel are only relevant for the automatic DITI handling feature.
See 17.1.2.1 "Process runtime settings for automatic DITI handling", 17-4.

Start Initial DiTi Load process

If you check this checkbox, there should not be any DITI racks on the worktable when you start the process.

Reset Counters

If you do not check *Start Initial DiTi Load process*, click this button if you want to re-load the worktable with full DITI racks before you start the process, for example to re-run the process from the beginning for testing. The *Reset Counters* button resets all of the DITI-related internal variables to their initial values. The *Reset Counters* button is not relevant if you have checked the *Start Initial DiTi Load process* checkbox (the counters are reset automatically in this case each time the process is run).

Information box

For each DITI type which is used in the process, this text box shows the source position of the full DITI racks which will be used next. In addition, it shows the position in the DITI Rack source (e.g. carousel or hotel) which will be used for the empty DITI racks during the next replacement operation. This position must be empty. Note: The empty DITI racks are returned to the carousel or hotel before getting the full DITI racks.

12.2.1 Process Controller during process runtime

Additional information is shown during process runtime as follows:

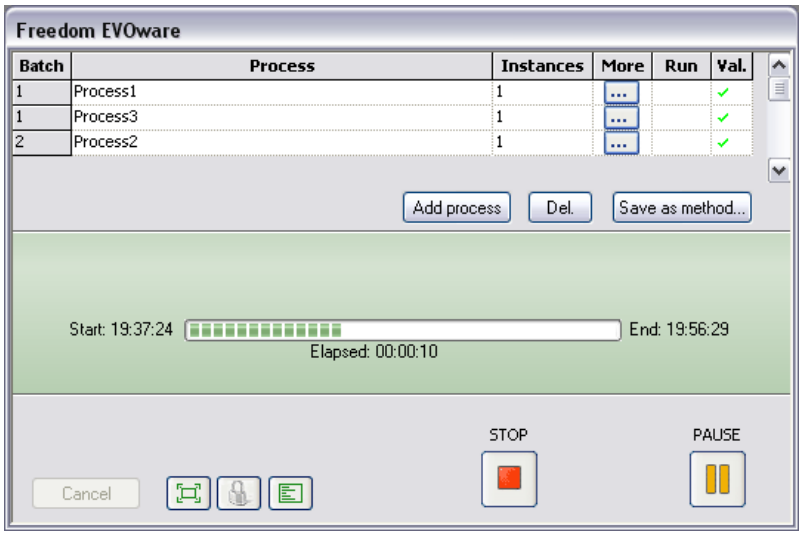


Fig. 12-5 *Process runtime showing progress bar*

Start

The time when the process was started.

Elapsed

The amount of time which has elapsed since the process was started.

End

The time when the process is expected to finish.

12.2.2 Additional Runtime Settings for Processes

Click [...] in the More field to make the following additional runtime settings for special applications:

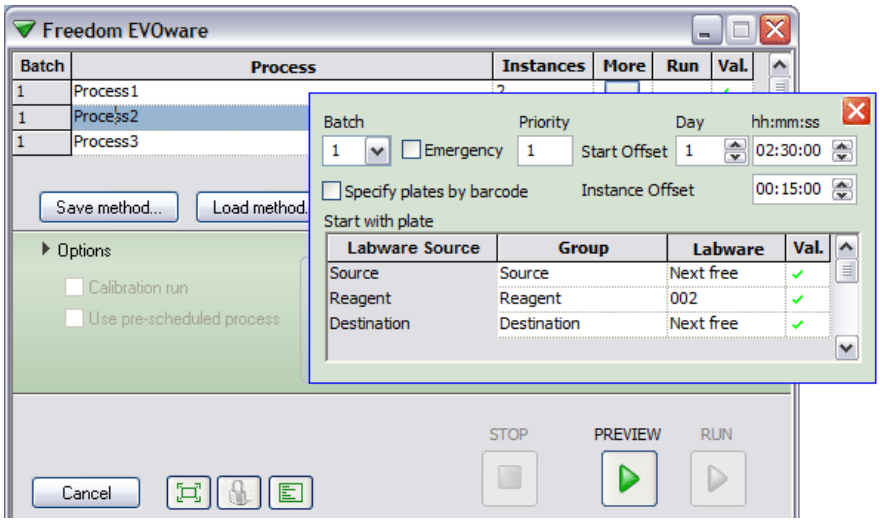


Fig. 12-6 *Additional runtime settings*

Batch

If you want to run more than one process type, you can assign batch numbers if you want them to group the processes into batches which run sequentially rather than in parallel. For example, if the processes “preparation” and “assay” are assigned the batch number 1 and the process “cleanup” is assigned the batch number 2, “preparation” and “assay” will run in parallel but “cleanup” will not be scheduled to start until both “preparation” and “assay” have finished. Usage example: The creation of a mother plate for subsequent use in assays. The batch number has a higher priority than the emergency checkbox. See also *Start offset*, below.

If you have assigned
Emergency

The *Emergency* checkbox is used to assign a higher priority to special processes. You can use emergency processes for samples which you want to process first or operations (such as barcode scanning) which you need to carry out first.

The standard (non-emergency) processes will only be started after all of the emergency processes have been started, even if they have a higher value in the *Priority* column. Freedom EVOware always starts emergency processes in the order of their priorities.

Priority

Specify the required process priority. Freedom EVOware tries to start processes which have a higher priority first. Note: Smaller numbers correspond to a lower priority (the lowest priority is “1”).

Start offset

Specify a starting offset in days to delay the starting of the process (range: 0 to 99 days).

Start offset and Time are additive. In the above figure, the process will be started after a delay of 1 day plus 2.5 hours (26.5 hours).

If you have chosen to run more than one instance (copy) of this process, the offset applies to all instances of the process.

Time

Specify a time in hours, minutes and seconds to delay the starting of the process. If you have configured more than one instance of this process, it applies to all instances of the process.

Start offset and Time are additive. In the above figure, the process will be started after a delay of 1 day plus 2.5 hours (26.5 hours).

If you have chosen to run more than one instance (copy) of this process, the time delay applies to all instances of the process.

Instance offset

If you have chosen to run more than one instance (copy) of this process, specify an instance offset if you do not want to start all of the instances simultaneously. The starting of the instances will then be staggered by the specified delay. This may be necessary e.g. if the pipetting instrument transfers processed samples to another piece of equipment which cannot handle a large number of samples simultaneously.

Specify plates by barcode

Check this checkbox if you want to run the process using specific labware items which are identified by their barcodes. A dialog box opens to allow you to choose a .txt or .csv file which contains a list of barcodes. See A.2.5 “Barcode File for the Freedom EVOware Plus Runtime Controller”, A-15 for information on the required syntax of this file.

This feature is only intended for random access storage devices such as the carousel (the stacker is a first-in last-out storage device, not random access). For labware in the carousel, you can use the ReadAllBarcodes or ReadPlatesInCartridge commands to read the barcodes and store them in a file (see 16.3 “Commands for the Carousel”, 16-2).

Labware source, Group, Labware, Val.

Click the Group field and choose the required labware if you want to run this process using a specific item of labware. You can choose labware from any of the labware sources which you have configured on your worktable.

Leave the labware fields empty if you do not want to use a specific labware item. In this case, the process will use the next labware item which is available for the configured labware source.

Val.: A green tick (“validated”) shows that enough labware has been assigned to the process. A red cross shows that process validation was not successful, for example because not enough labware is available for the specified number of instances or the same labware has been assigned to two different processes (invalid assignment).

12.2.3 Buttons in Standard View

Cancel

Return to the Process Editor.

Extended view

Switch to the extended view of the Runtime Controller where you can get more information on the currently running process.

Lock Freedom EVOware

This button logs out the current Freedom EVOware user (see 6.1.9 “Lock EVOware”, 🗎 6-7). Another use of the Lock button is to switch Freedom EVOware users when you are handing over to another employee, e.g. due to a change of shift.

Show Log File

This button displays the Freedom EVOware log file in a new window. The log file tracks every command sent by the computer to the instrument, every response returned from the instrument to the computer and any user input. The content and format of the log corresponds to a log file of type LOG (see A.1 “Overview of the Log Files”, 🗎 A-1).

Stop

This button runs the process; it is also used to continue the process if it has been paused.

Preview

This button previews the process; it is also used to continue the process if it has been paused.

Run

This button runs the process; it is also used to continue the process if it has been paused.

Pause

This button pauses the process.

If you have already run the process

Click **Save Schedule** to save a schedule for this process. Schedules can be use to ensure that processes always run the same way and use the same timing.
Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again from the beginning. If you want to save a schedule for this process, do this before you click *New Run*.

If the process has stopped before being completed

Click **Recover** to start the Process Recovery Wizard (see 17.2.2.2 “Process Recovery Wizard, Recovery Settings”, 17-10).
Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again from the beginning.

If you have just made a calibration run

Click Optimize first if you want to optimize the schedule before saving it.
Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again. If you want to save a schedule for this process, do this before you click New.
Click **Update Proc** to store information in the process file on the actual times required by device commands. The next time you run the process, the stored information allows the scheduler to plan more accurately and thus optimize the throughput of the process.
Click **Optimize** to optimize the schedule using the real execution times which were recorded during the calibration run. You must then click Save to save the optimized schedule.
Click **Save Schedule** to save a schedule for this process. Schedules can be used to ensure that processes always run the same way and use the same timing.

12.2.4 Runtime Controller, Extended View (Running a Process)

The Extended View option of the runtime controller gives you more information on the currently running Freedom EVOware processes:

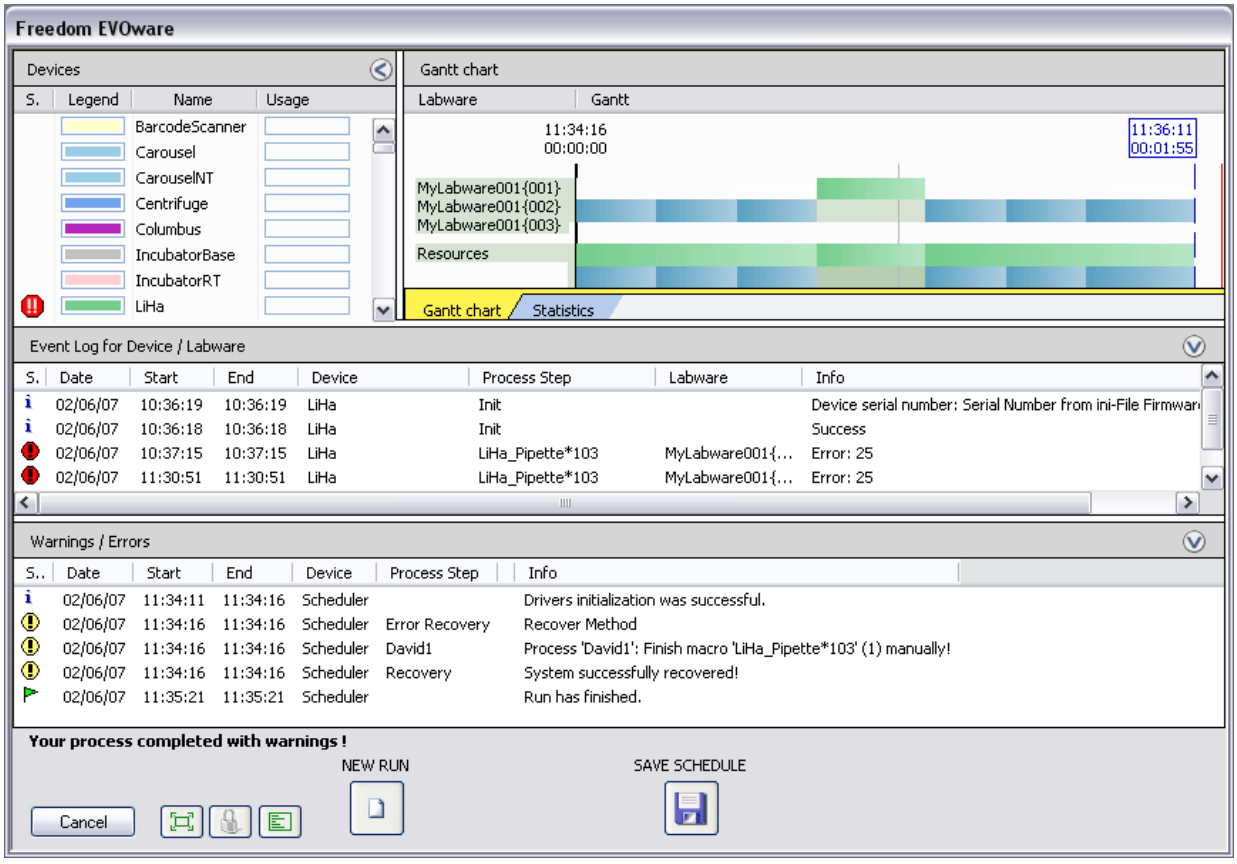


Fig. 12-7 *Process runtime - Extended view (showing the Gantt Chart window)*

The extended view has four windows:

- The **Devices window** - This shows the colors which are assigned to each of the devices in the Gantt chart and the current device utilization in percent when the process is running. The colors which are assigned to the devices are configurable (see 8.4.1.2 “Colors Tab”, 8-22).
  Click on a device in the Devices window to see all available messages for the device (the list shows all messages since Freedom EVOware was last started). Coloured buttons are shown in the Devices window if device warnings or errors have occured.
- The **Gantt chart / Statistics window**
  Click the **Gantt chart** tab to get a graphical representation of the currently running process(es). For each labware item or resource, the process steps or actions which will take place (have already taken place) are shown as horizontal colored bars. When a process is running, the vertical red line indicates the progess of process execution.
  Click on a horizontal colored bar to get more information on the process step or action. The first line of the Info window shows the process name and the process instance ID. To zoom in to a particular part of the chart, click with the mouse and drag open a rectangle which encloses the part of interest. To reset the zoom, right-click on the chart and choose *Fit to page* from the context

menu.
Click on a labware item in the Labware column to see all available messages for the labware (the list shows all messages since Freedom EVOware was last started).
If you have added comments to the process steps (in the Process Editor), the comments are shown in the Gantt chart as tool tips (yellow labels which appear when you move the cursor above the horizontal colored bars). If you choose suitable comments, this can help you to identify different parts of the Gantt chart. See 9.10.5 “Comment”, 9-76.
Click the **Statistics** tab to get statistics on resource utilization for the process (see figure below). When you run the process, the information becomes available as soon as the the process schedule has been calculated. The information which is provided makes it easier to locate resource bottlenecks which could reduce the process performance (throughput).

- The **Event log window** - This shows information on important events for devices and labware.
- The **Warnings/Errors window** - This shows process warnings and errors.

If one of the messages is shown truncated because it is too long, lengthen the field in the dialog box and activate the horizontal scroll bar by double-clicking on the divider (short vertical line in the header) at the end of the field.

If you need more space for the Gantt chart, you can collapse the Event log and/or Messages/Error windows by clicking in the title bar. In addition, you can collapse the Devices windows by clicking in the title bar. You can also resize the windows by dragging the dividers between the windows.

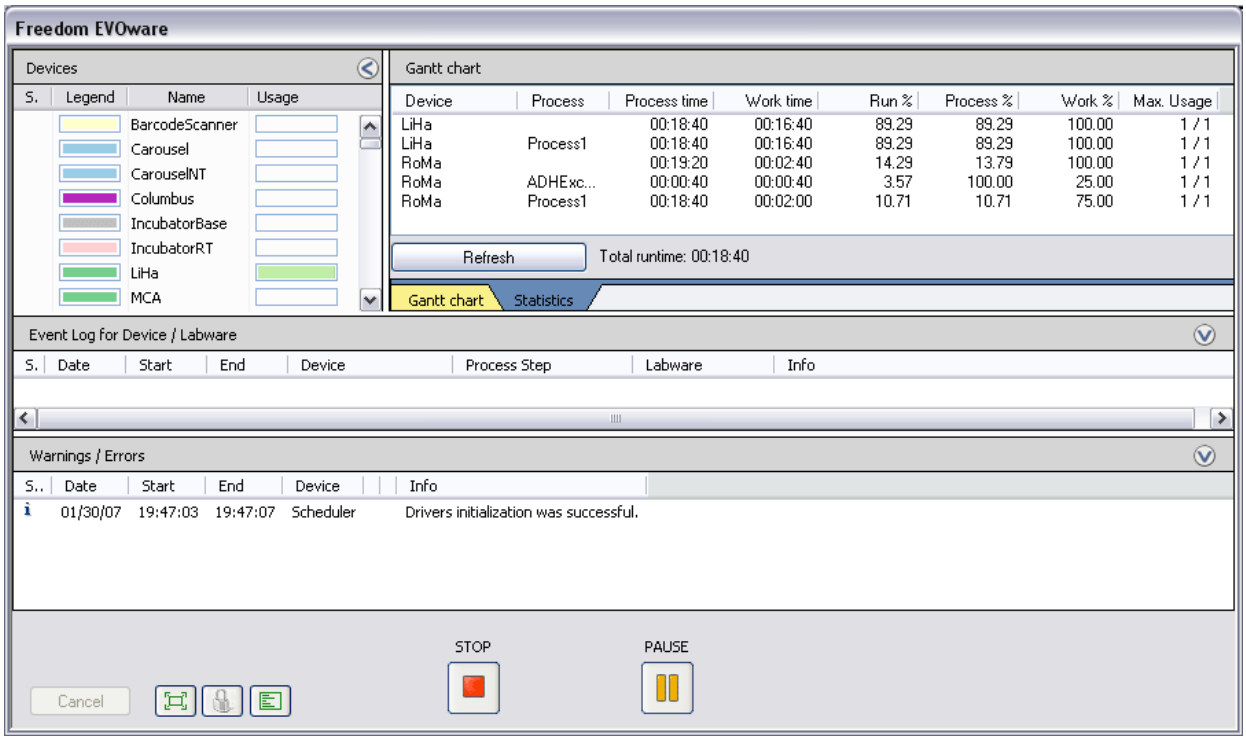


Fig. 12-8 *Process runtime - Extended view (showing the Statistics window)*

12.2.5 Buttons in Extended View

Cancel
Return to the Process Editor.

Standard view
Return to the standard view of the Runtime Controller.

Lock Freedom EVOware
This button logs out the current Freedom EVOware user (see 6.1.9 “Lock EVOware”, 🗎 6-7). Another use of the Lock button is to switch Freedom EVOware users when you are handing over to another employee, e.g. due to a change of shift.

Show Log File
This button displays the Freedom EVOware log file in a new window.

Stop
This button runs the process; it is also used to continue the process if it has been paused.

Preview
This button previews the process; it is also used to continue the process if it has been paused.

Run
This button runs the process; it is also used to continue the process if it has been paused.

Pause
This button pauses the process.

If you have already run the process

Save schedule
Click **Save schedule** to save a schedule for this process. Schedules can be use to ensure that processes always run the same way and use the same timing.
Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again. If you want to save a schedule for this process, do this before you click *New Run*.

If the process has stopped before being completed

Click **Recover** to start the Process Recovery Wizard (see 17.2.2.2 “Process Recovery Wizard, Recovery Settings”, 🗎 17-10).
Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again from the beginning.

If you have just made a calibration run

Click Optimize first if you want to optimize the schedule before saving it.
Click **New Run** to return to the standard view of the Runtime Controller, e.g. to run the process again. If you want to save a schedule for this process, do this before you click New.
Click **Update Proc** to store information in the process file on the actual times required by device commands. The next time you run the process, the stored information allows the scheduler to plan more accurately and thus optimize the throughput of the process.
Click **Optimize** to optimize the schedule using the real execution times which were recorded during the calibration run. You must then click Save to save the optimized schedule.
Click **Save Schedule** to save a schedule for this process. Schedules can be used to ensure that processes always run the same way and use the same timing.

13 Overview of Freedom EVOware Commands

This chapter gives an overview of the commands which are available in Freedom EVOware Standard and Freedom EVOware Plus.

After creating a worktable and choosing/defining the carriers and labware that you want to use, the process or pipetting script is created by selecting commands from the Control Bar (see 11 “Getting Started - Setting Up a New Script or Process”, 11-1).

In this chapter, the commands are divided into two sections - script commands and device commands - and each section is divided into groups (e.g. Liquid Handling Arm commands). The same groups are used in the Control Bar. See *Commands* in the index for an alphabetic list of the commands.

Some of the commands will only be shown in the Control Bar if your pipetting instrument is fitted with the appropriate hardware option.

In addition, you can hide commands which you do not normally use (see 5.4.1.13 “Context Menu for Group Titles in the Control Bar”, 5-15).

Tecan and third party software add-ons for Freedom EVOware may add additional script and/or device commands to the Control Bar which are not described in this manual. In this case, refer to the instruction manual for the respective software add-on for more information.

13.1 Overview of Script Commands

In Freedom EVOware Plus, when the Script Editor is open the Commands tab of the Control Bar only shows script commands (commands which are used for writing pipetting scripts). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices, see 13.2 “Overview of Device Commands”, 13-12).

In Freedom EVOware Standard, the Control Bar always shows both command types (it does not have a Process Editor).

Tecan and third party software add-ons for Freedom EVOware may add additional script and/or device commands to the Control Bar which are not described in this manual. In this case, refer to the instruction manual for the respective software add-on for more information.

13.1.1 Liquid Handling Arm (LiHa) Commands, Overview

The following table lists the commands for the liquid handling arm. To use these commands in Freedom EVOware Plus, add the device command “Liquid Handling Arm - Pipette” to your process; this opens the Script Editor (see 16.13.2, 16-47).

If your pipetting instrument is fitted with two liquid handling arms (and you have installed drivers for both of them), there will be two liquid handling arm groups in the Control Bar (Liquid Handling Arm and Liquid Handling Arm 2). Use the commands in the group “Liquid Handling Arm” if you want to pipette with the first LiHa. Use the commands in the group “Liquid Handling Arm 2” if you want to pipette with the second LiHa. The commands themselves are identical in both groups. The Script Editor window appends a “2” to the commands which are destined for the second LiHa (e.g. “Aspirate 2”).

Tab. 13-1 *Liquid Handling Arm (LiHa) commands*

	Aspirate - The Aspirate command is used to pick up liquid from specified positions on the worktable. See 15.1 “Aspirate Command”, 🗎 15-1.
	Dispense - The Dispense command is used to dispense liquid to specified positions on the worktable. See 15.2 “Dispense Command”, 🗎 15-3.
	Mix - The Mix command performs a mix operation by aspirating and then dispensing at the same position. See 15.3 “Mix Command”, 🗎 15-5.
	Wash Tips - The Wash Tips command is used to flush and wash fixed tips or to flush DITI adapters using a wash station. It is not intended for flushing DITI tips. See 15.4 “Wash Tips Command”, 🗎 15-8.
	Periodic Wash - The Periodic Wash command is used to flush DITI adapters in a wash station at specified, regular intervals. It is not intended for flushing DITI tips. See 15.5 “Periodic Wash Command”, 🗎 15-10.
	Activate DITI Handling - The Activate DITI Handling command activates the automatic DITI handling feature in your pipetting script and specifies the DITI replacement script to use. See 15.6 “Activate DITI Handling Command”, 🗎 15-12.
	Get DITIs - The Get DITIs command is used to pick up DiTis (disposable tips) of the specified capacity from a DITI rack. Freedom EVOware keeps track of their position on the worktable and automatically chooses the next available unused DiTi. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See 15.7 “Get DITIs Command”, 🗎 15-13.
	Drop DITIs - The Drop DITIs command is used to discard the specified DITIs into the specified DITI waste. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See 15.8 “Drop DITIs Command”, 🗎 15-14.
	Set DiTi Position - The Set DiTi Position command is used to specify the location of the next DiTi which should be used by the Get DiTis command. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See 15.9 “Set DITI Position Command”, 🗎 15-15.
	Pick Up DITIs - The Pick Up DITIs command is used to pick up DITIs which have already been used and put back into the DiTi rack with the Set DITIs Back command. You must specify the DiTis you want to pick up. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See 15.10 “Pick Up DITIs Command”, 🗎 15-16.
	Set DITIs Back - The Set DITIs Back command is used to return used DITIs to specified positions on a DiTi rack for later use. This command requires the Lower DiTi Eject option. This command is only shown in the Control Bar if you are using DiTis on the LiHa. See 15.11 “Set DITIs Back Command”, 🗎 15-18.
	Pickup ZipTip - The Pickup ZipTip command is used to pick up ZipTips. See 15.12 “Pickup ZipTip Command”, 🗎 15-19.
	Detect Liquid - The Detect Liquid command is used to carry out liquid level detection without pipetting and reports the liquid volume for each of the chosen wells in the rack. See 15.13 “Detect Liquid Command”, 🗎 15-20.
	Te-Fill Aspirate - The Te-Fill Aspirate command is used to pick up liquid from specified positions on the worktable using the Te-Fill option. See 15.14 “Te-Fill Aspirate Command”, 🗎 15-22

Tab. 13-1 Liquid Handling Arm (LiHa) commands (cont.)

	Te-Fill Dispense - The Te-Fill Dispense command is used to dispense liquid to specified positions on the worktable using the Te-Fill option. See 15.15 “Te-Fill Dispense Command”, 🗎 15-24
	Te-Fill Prime - The Te-Fill Prime command is used to prime the liquid channel of the Te-Fill option. See 15.16 “Te-Fill Prime Command”, 🗎 15-26
	Te-Fill Switch Valve - The Te-Fill Switch Valve command is used for special applications which require the Te-Fill liquid path to be selected but without aspirating or dispensing. See 15.17 “Te-Fill Switch Valve Command”, 🗎 15-28
	Activate PMP - The Activate PMP command is used to activate the PMP (Pressure Monitored Pipetting) function at the appropriate point in your pipetting script. You must do this before getting (mounting) the PMP-controlled DiTis. See 15.18 “Activate PMP Command”, 🗎 15-29.
	Deactivate PMP - The Deactivate PMP command is used to deactivate the PMP (Pressure Monitored Pipetting) function at the appropriate point in your pipetting script. You must do this after finishing the pipetting sequence and dropping the DITIs. See 15.19 “Deactivate PMP Command”, 🗎 15-30.
	Tip Alignment Check - The Tip Alignment Check command is used to check and readjust the alignment of the Liquid Handling Arm (LiHa) during script runtime. This function is normally only necessary if you are using microplates with 1536 wells or other high precision labware. See 15.20 “Tip Alignment Check Command”, 🗎 15-30.
	Move LIHA - The Move LIHA command is used to move the liquid handling arm from one position to another without performing an Aspirate or Dispense operation. See 15.21 “Move LiHa Command”, 🗎 15-33.
	Waste - The Waste command is used to control the vacuum-assisted waste (instrument option for viscous liquids which creates a partial vacuum in the waste bottles). See 15.22 “Waste Command”, 🗎 15-35.
	Active WashStation – The Active WashStation command is used to control the pressure pump of the Active WashStation. It is mainly intended for ZipTips. See 15.23 “Active WashStation Command”, 🗎 15-36.
	Worklist - The Worklist command is used to load a worklist file or run previously loaded worklist files. A worklist file is a text file containing instructions for the pipetting instrument. It contains information on source and destination positions and the volumes to pipette. See 15.24 “Worklist Command”, 🗎 15-36.
	Worklist Import - The Worklist Import command is used to create an Freedom EVOware worklist from an Excel file which is stored in CSV format. See 15.25 “Worklist Import Command”, 🗎 15-46.
	Export Data - The Export Data command is used to create report files for selected labware or for all labware on the worktable or the Te-MO deck. The report files contain information about the pipetting which has been carried out. See 15.26 “Export Data Command”, 🗎 15-48.
	Manual Tip Alignment - The Manual Tip Alignment command is used to check the alignment of the Liquid Handling Arm (LiHa) before or after running a script. It is also able to detect bent tips. This function is normally only necessary if you are using microplates with 1536 wells or other high precision labware. See 15.27 “Manual Tip Alignment Command”, 🗎 15-57. This command is mainly intended for use in maintenance scripts (see 6.4.2 “Run Maintenance”, 🗎 6-10).

13.1.2 Wizards, Overview

The following table lists advanced commands which are configured using wizards. To use these commands in Freedom EVOware Plus, add the device command “Liquid Handling Arm - Pipette” to your process; this opens the Script Editor (see 16.13.2, 16-47).

***Tab. 13-2** Wizards*

	Copy Plate - The Copy Plate wizard creates a set of script commands which make identical copies of the source plate on one or more destination plates. You can copy the whole plate or a rectangular selection of wells. See 15.28 “Copy Plate Wizard”, 15-59.
	Replicates - The Replicates wizard creates a set of script commands which make one or more repetitions (copies) of selected wells on the source plate on one or more destination plates. All of the destination plates will be identical. You can only create horizontal replicates. See 15.29 “Replicates Wizard”, 15-63.
	Serial Dilution - The Serial Dilution wizard creates a set of script commands which perform a serial dilution in two or more steps. Each dilution step has the same dilution factor. See 15.30 “Serial Dilution Wizard”, 15-69.
	Merge Plates - The Merge Plates wizard creates a set of script commands which make a destination plate (e.g. a 384 well plate) by merging together wells from one or more source plates (e.g. four 96 well plates). See 15.31 “Merge Plates Wizard”, 15-77.
	Transfer - The Transfer wizard creates a set of script commands which aspirate liquid from specified wells on the source plate and transfer it to destination positions See 15.32 “Transfer Wizard”, 15-85.
	MCA Merge Plate - The MCA Merge Plate wizard creates a set of script commands for the MCA96 which merge four 96-well microplates into one 384-well microplate. See 15.33 “MCA Merge Plate Wizard”, 15-90.

13.1.3 Programming Commands, Overview

The following table lists the script programming commands. To use these commands in Freedom EVOware Plus, add the device command “Liquid Handling Arm - Pipette” to your process; this opens the Script Editor (see 16.13.2, 16-47).

Tab. 13-3 Script programming commands

	Start Timer - The Start Timer command re-starts one of the 100 internal timers in Freedom EVOware. See 15.34 “Start Timer Command”, 15-95.
	Wait for Timer - The Wait for Timer command pauses the execution of the script until a specified number of seconds have expired since a specified timer was started. See 15.35 “Wait for Timer Command”, 15-95.
	Execute Application - The Execute Application command instructs Freedom EVOware to run an external program from within a pipetting script. You can run DOS and Windows applications. See 15.36 “Execute Application Command”, 15-96.
	Comment - The Comment command is used to insert a comment for a script command or for some other reason. It is used to annotate the script and is not executable. See 15.37 “Comment Command”, 15-97. Use the User Prompt command instead if you want to prompt the instrument operator. Comment commands are also used as labels by the Condition command.
	User Prompt - The User Prompt command is an informational command that displays a prompt on the screen as a reminder to the operator to execute a function or to perform a special action. See 15.38 “User Prompt Command”, 15-98.
	Begin Loop - The Begin Loop command instructs Freedom EVOware to repeat a command or a set of commands (i.e. a loop) a specified number of times until the matching End Loop command is encountered in the script. See 15.39 “Begin Loop Command”, 15-100.
	End Loop - The End Loop command terminates the loop which is initiated by the matching Begin Loop command. The End Loop command is inserted in the script automatically when you add the Begin Loop command. Freedom EVOware uses the same loop name for the Begin Loop command and the End Loop command. See 15.40 “End Loop Command”, 15-100.
	Set Variable - The Set Variable command is used to declare a numeric or string variable in a pipetting script and to assign an initial value. You can also prompt the operator for the value. See 15.41 “Set Variable Command”, 15-101.
	Import Variable - The Import Variable command is used to import values for script variables from a file during script runtime. You can import values for variables which are already declared (defined) in the script. You can also use this command to declare new variables for use in the script and assign an initial value which is read from the import file. See 15.42 “Import Variable Command”, 15-103.
	Export Variable - The Export Variable command is used to export the values of script variables to a file during script runtime. See 15.43 “Export Variable Command”, 15-107.
	Condition - The Condition command is used to jump to a specified line in the script if a specified condition is met. See 15.44 “Condition Command”, 15-109.
	If - Then - The If -Then command is used to execute a set of script commands if a specified condition is met and execute a different set of commands if the condition is not met (Else condition. See 15.45 “If - Then Command”, 15-111.
	Group - The Group command is used to group together script commands to make long scripts easier to understand. When you insert a Group command, a Group End command is also inserted. Click the “-” button in the Group command icon in the Script Editor if you want to collapse and hide all of the script lines in the group. See 15.48 “Group Command”, 15-112.

Tab. 13-3 Script programming commands (cont.)

	Sub-Routine - The Sub-Routine command executes another script as part of the current script. The Sub-Routine command is not available in Freedom EVOware Plus. See 15.49 “Sub-Routine Command”, 15-113.
	Execute VB Script – The Execute VB Script command is used to execute a Visual Basic (VB) script from within an Freedom EVOware script. See 15.50 “Execute VB Script Command”, 15-114.
	Notification - The Notification command is used to send an email from within a script (e.g. to inform an operator in another room that a certain process has finished). It can also be used to send an automatic email if an error occurs during script execution. See 15.51 “Notification Command”, 15-116.
	Start Script - The Start Script command starts another script from the currently running script, which is terminated. In contrast to sub-routines, the new script can use a different worktable layout to the original script. The Start Script command is not available in Freedom EVOware Plus. See 15.52 “Start Script Command”, 15-117.
	On Error Goto - The On Error Goto command is used to jump to a specified line in the script if an error occurs during script runtime. Error recovery commands then allow the pipetting script to react automatically to the error. See 15.53 “On Error Goto Command”, 15-118.
	Resume - The Resume command is used together with the On Error Goto command and specifies where to resume running the script after executing the error recovery commands. See 15.54 “Resume Command”, 15-119.
	End Script - The End Script command is used to stop the pipetting script prematurely and to specify a return code (error code) for the script. It is typically used together with error recovery commands. See 15.55 “End Script Command”, 15-120.

13.1.4 Commands for the Te-MO, Overview

The following table lists the commands for the Te-MO.
To use these commands in Freedom EVOware Plus, add the device command “Te-MO - Pipette” to your process; this opens the Script Editor (see 16.36.2, 16-120).

Tab. 13-4 Te-MO commands

	Te-MO Aspirate – The Te-MO Aspirate command is used to pick up liquid from specified positions on the Te-MO. It is analogous to the Aspirate command for the LiHa. See 15.56.1 “Te-MO Aspirate Command”, 15-122.
	Te-MO Dispense – The Te-MO Dispense command is used to dispense liquid to specified positions on the Te-MO. It is analogous to the Dispense command for the LiHa. See 15.56.2 “Te-MO Dispense Command”, 15-124.
	Te-MO Mix – The Te-MO Mix command performs a mix operation by aspirating and then dispensing at the same Te-MO position. It is equivalent to the Mix command for the LiHa. See 15.56.3 “Te-MO Mix Command”, 15-125.
	Te-MO Wash – The Te-MO Wash command is used to wash the Te-MO tips or DITIs using the specified Te-MO 96 wash block. It is designed for standard Te-MO tip blocks and DITi pipetting heads with 96 tips. See 15.56.4 “Te-MO Wash Command”, 15-127.

Tab. 13-4 Te-MO commands (cont.)

	Te-MO Wash 384 Tip Head - The Te-MO Wash 384 Tip Head command is used to wash the Te-MO tips using the specified Te-MO 384 wash block. It is designed for 384-tip pipetting heads. See 15.56.5 “Te-MO 384 Wash Tip Head Command”, 🗎 15-130.
	Te-MO Get DITIs – The Te-MO Get DITIs command is used to pick up disposable tips of the specified capacity from a specified position on the Te-MO. See 15.56.6 “Te-MO Get DITIs Command”, 🗎 15-132.
	Te-MO Drop DITIs – The Te-MO Drop DITIs command is used to return the disposable tips to a specified position on the Te-MO. See 15.56.7 “Te-MO Drop DITIs Command”, 🗎 15-133.
	Te-MO Get Tip Block – The Te-MO Get Tip Block command is used to pick up a tip block from a specified position on the Te-MO. It is analogous to the Te-MO Get DITIs command. See 15.56.8 “Te-MO Get Tip Block Command”, 🗎 15-134.
	Te-MO Drop Tip Block – The Te-MO Drop Tip Block command is used to put down the tipblock at a specified position on the Te-MO. It is analogous to the Te-MO Drop DITIs command. See 15.56.9 “Te-MO Drop Tip Block Command”, 🗎 15-135.
	Te-MO Refill Trough - The trough is a special carrier on the Te-MO which is used as a container for a reagent liquid. The Te-MO Refill Trough command is used to refill the trough with reagents. See 15.56.10 “Te-MO Refill Trough Command”, 🗎 15-135.
	Te-MO Relative Movements - The Te-MO Relative Movements command is used to perform Te-MO movements with an offset. It can be used e.g. to program a serial dilution. It is only available for the Te-MO 96. See 15.56.11 “Te-MO Relative Movements Command”, 🗎 15-136.
	Export Data - The Export Data command is used to create report files for selected labware or for all labware on the worktable or the Te-MO deck. The report files contain information about the pipetting which has been carried out. See 15.26 “Export Data Command”, 🗎 15-48.
	Load the Te-MO - The Load the Te-MO command is used to move a specified Te-MO site to the RoMa exchange position (transfer position) to make it easier to exchange the labware manually. See 15.56.12 “Load the Te-MO Command”, 🗎 15-138. This command is mainly intended for use in maintenance scripts (see 6.4.2 “Run Maintenance”, 🗎 6-10).
	Fill System (384 tip head) - The Fill system (Te-MO 384) command is used to fill and flush the 384-tip Te-MO pipetting system and to prime the wash block of the Te-MO 384 Wash & Refill Center. See 15.56.13 “Fill system (Te-MO 384) Command”, 🗎 15-138. This command is mainly intended for use in maintenance scripts (see 6.4.2 “Run Maintenance”, 🗎 6-10).

13.1.5 Commands for the Plate Robot, Overview

The following table lists the commands for the Robot manipulator (RoMa). These commands are only available in Freedom EVOware Standard. In Freedom EVOware Plus, plate robot actions are normally specified as pre-actions and post-actions of device commands (see 8.5.35.3 “Pre-actions and Post-actions Tabs”, 🗎 8-119).

Tab. 13-5 *Commands for the plate robot*

	Move RoMa - The Move RoMa command is used to carry out simple RoMa movements. See 15.57 “Move RoMa Command”, 15-140.
	RoMa Vector - The RoMa Vector command executes a RoMa vector, which is a predefined sequence of RoMa movements. You can also specify gripper actions at the Safe and End positions. See 15.58 “RoMa Vector Command”, 15-141.
	Transfer Labware - The Transfer Labware command is used to to transfer labware (e.g. a microplate) from one position to another with the plate robot (RoMa) . The same action can be carried out by defining two RoMa Vector commands and using two RoMa vectors. See 15.59 “Transfer Labware Command”, 15-143.

13.1.6 Commands for the Tube Robot, Overview

The following table lists the commands for the Pick & Place arm (PnP).
To use these commands in Freedom EVOware Plus, add the device command “Tube Robot - Execute Script” to your process; this opens the Script Editor (see 16.25.1, 16-83).

Tab. 13-6 *Commands for the tube robot*

	Move PnP - The Move PnP command is used to carry out simple PnP movements. See 15.60 “Move PnP Command”, 15-145.
	PnP Vector - The PnP Vector command executes a PnP vector, which is a predefined sequence of PnP movements. You can also specify gripper actions at the Safe and End positions. See 15.61 “PnP Vector Command”, 15-146.
	Transfer Tube - The Transfer Tube command is used to transfer a tube from one position to another with the tube robot (PnP) . The same action can be carried out by defining two PnP Vector commands and using two PnP vectors. See 15.62 “Transfer Tube Command”, 15-148.

13.1.7 Commands for Identification Devices, Overview

The following table lists the command for the PosID movable barcode scanner. The PosID-3 (a new, improved version of the PosID hardware) uses device commands instead of script commands. If your pipetting instrument is fitted with the PosID-3 instead of the PosID, the Identification Devices group of the Control Bar will not contain any commands. The PosID-3 device commands can be found in the PosID-3 group of the Control Bar.

Tab. 13-7 *Commands for identification devices*

	PosID - The PosID command is used to read the barcode labels on one or more pieces of labware using the PosID option. The PosID (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. See 15.63 “PosID Command”, 15-150.

13.1.8 Miscellaneous Commands, Overview

The following table lists the script commands for miscellaneous devices. To use these commands in Freedom EVOware Plus, add the device command “Liquid Handling Arm - Pipette” to your process; this opens the Script Editor (see 16.13.2, 16-47).

Tab. 13-8 *Commands for miscellaneous devices*

	Waterbath Control – The Waterbath Control command is used to control the waterbaths for the Te-Flow option. The Te-Flow option provides support for the In Situ Hybridization method. See 15.64 “Waterbath Control Command”, 15-154.
	Balance - The Balance command is used to read a weight from the Mettler balance and store it in a variable. See 15.65 “Balance Command”, 15-155.
	Balance Send Command - The Balance Send Command command allows you to send a firmware command directly to the Mettler balance. This command is only intended for specialists. See 15.66 “Balance Send Command Command”, 15-157.
	Send Command - The Send Command command allows you to send a firmware command directly to the pipetting instrument. This command is only intended for specialists. See 15.67 “Send Command Command”, 15-158.

13.1.9 Commands for the MCA96 (Multi Channel Arm 96), Overview

The following table lists the script commands for the MCA96.

Tab. 13-9 *Commands for the MCA96*

	Aspirate - The MCA96 Aspirate command is used to pick up liquid from specified positions on the worktable of the pipetting instrument using the multi channel arm. See 15.68.1 “MCA96 Aspirate Command”, 15-159.
	Dispense - The MCA96 Dispense command is used to dispense liquid to specified positions on the worktable of the pipetting instrument using the multi channel arm. See 15.68.2 “MCA96 Dispense Command”, 15-161.
	Mix - The MCA96 Mix command performs a mix operation by aspirating and then dispensing at the same position using the multi channel arm. See 15.68.3 “MCA96 Mix Command”, 15-162.
	Wash - The MCA96 Wash command is used to wash MCA96 tips or MCA96 DITIs using the specified MCA96 wash block. See 15.68.4 “MCA96 Wash Command”, 15-164.
	Get DITIs - The MCA96 Get DITIs command is used to pick up disposable tips for the multi channel arm from a specified position on the worktable of the pipetting instrument. See 15.68.5 “MCA96 Get DITIs Command”, 15-167.
	Drop DITIs - The MCA96 Drop DITIs command is used to return the disposable tips of the multi channel arm to a specified position on the worktable of the pipetting instrument. See 15.68.6 “MCA96 Drop DITIs Command”, 15-168.
	Get Tipblock - The MCA96 Get Tip Block command is used to pick up a tip block for the MCA96 from a specified position on the worktable of the pipetting instrument. See 15.68.7 “MCA96 Get Tip Block Command”, 15-170.

Tab. 13-9 Commands for the MCA96 (cont.)

	Drop Tipblock - The MCA96 Drop Tip Block command is used to put down the tip-block of the MCA96 at a specified position on the worktable of the pipetting instrument. See 15.68.8 “MCA96 Drop Tip Block Command”, 15-171.
	Relative Movements - The MCA96 Relative Movements command is used to perform movements of the MCA96 with an offset. It can be used e.g. to program a serial dilution. See 15.68.9 “MCA96 Relative Movements Command”, 15-171.
	Move - The MCA96 Move command is used to move the MCA96 from one position to another without performing an Aspirate or Dispense operation. See 15.68.10 “MCA96 Move Command”, 15-174.
	Vector - The MCA96 Vector command executes an MCA96 vector, which is a predefined sequence of MCA96 movements. You can also specify gripper actions at the Safe and End positions. Gripper actions require the MCA96 gripper option. See 15.68.11 “MCA96 Vector Command”, 15-175.
	Transfer Labware - The MCA96 Transfer Labware command is used to transfer labware (e.g. a microplate) from one position to another with the MCA96 gripper. The same action can be carried out using two MCA96 Vector commands. This command requires the MCA96 gripper option. See 15.68.12 “MCA96 Transfer Labware Command”, 15-177.

13.1.10 Commands for the MCA384 (Multi Channel Arm 384), Overview

The following table lists the script commands for the MCA384.

Tab. 13-10 Commands for the MCA384

	Aspirate - The MCA384 Aspirate command is used to pick up liquid from specified positions on the worktable of the pipetting instrument using the multi channel arm. See 15.69.2 “MCA384 Aspirate Command”, 15-181.
	Dispense - The MCA384 Dispense command is used to dispense liquid to specified positions on the worktable of the pipetting instrument using the multi channel arm. See 15.69.3 “MCA384 Dispense Command”, 15-183.
	Mix - The MCA384 Dispense command performs a mix operation by aspirating and then dispensing at the same position using the multi channel arm. See 15.69.4 “MCA384 Mix Command”, 15-185.
	Wash - The MCA384 Wash command is used to wash the MCA384 tips or MCA384 DITIs using the specified MCA384 wash block. See 15.69.5 “MCA384 Wash Command”, 15-187.
	Get Head Adapter - The MCA384 Get Head Adapter command is used to pick up an adapter plate for the multi channel arm from a specified position on the worktable of the pipetting instrument. See 15.69.6 “MCA384 Get Head Adapter Command”, 15-189.
	Drop Head Adapter - The MCA384 Drop Head Adapter command is used to put down the adapter plate of the multi channel arm at a specified position on the worktable of the pipetting instrument. See 15.69.7 “MCA384 Drop Head Adapter Command”, 15-190.

Tab. 13-10 Commands for the MCA384 (cont.)

	Get DITIs - The MCA384 Get DITIs command is used to pick up disposable tips for the multi channel arm from a specified position on the worktable of the pipetting instrument. See 15.69.8 “MCA384 Get DITIs Command”, 15-191.
	Drop DITIs - The MCA384 Drop DITIs command is used to return the disposable tips of the multi channel arm to a specified position on the worktable of the pipetting instrument. See 15.69.9 “MCA384 Drop DITIs Command”, 15-194.
	Move - The MCA384 Move command is used to move the MCA384 from one position to another without performing an Aspirate or Dispense operation. See 15.69.10 “MCA384 Move Command”, 15-198.
	Vector - The MCA384 Vector command executes a CGM vector, which is a predefined sequence of CGM movements. You can also specify gripper actions at the Safe and End positions. This command requires the CGM (common gripper module), which is a hardware option for the MCA384. See 15.69.11 “MCA384 Vector Command”, 15-199.
	Transfer Labware - The MCA384 Transfer Labware command is used to transfer labware (e.g. a microplate) from one position to another with the CGM. The same action can be carried out using two MCA384 Vector commands. This command requires the CGM (common gripper module), which is a hardware option for the MCA384. See 15.69.12 “MCA384 Transfer Labware Command”, 15-201.
	Dock CGM - The MCA384 Dock CGM command is used to dock the CGM around the MCA384 pipetting head. This reduces the amount of space required by the MCA384/CGM hardware. The CGM (common gripper module) is a hardware option for the MCA384. See 15.69.13 “MCA384 Dock CGM Command”, 15-204.
	Undock CGM - The MCA384 Undock CGM command is used to undock the CGM from the MCA384 pipetting head. The CGM can only be used for gripping and transferring labware when it is undocked. The CGM (common gripper module) is a hardware option for the MCA384. See 15.69.14 “MCA384 Undock CGM Command”, 15-204.

13.1.11 Commands for the Common Notification Server, Overview

The following table lists the command for the Common Notification Server. The Common Notification Server (CNS) is a central Tecan software component which is responsible for sending notification messages to administrators, users or operators of the pipetting instrument. The CNS complements the features of the Notification script command.

Tab. 13-11 Commands for the Common Notification Server

	SendNotification - The Common Notification Server (CNS) is a central Tecan software component which is responsible for sending notification messages. The SendNotification command is used to send a message to one or more recipients. See 15.70 “CNS SendNotification command”, 15-205.

13.2 Overview of Device Commands

In Freedom EVOware Plus, when the Process Editor is open the Control Bar only shows device commands (commands which are used for controlling optional devices).

Conversely, when the Script Editor is open the Control Bar only shows script commands (commands which are used for writing pipetting scripts). See 11.5.5 “Creating a Script for the Pipette Command”, 🗎 11-12).

In Freedom EVOware Standard, both command types are shown in the Control Bar (it does not have a Process Editor).

Tecan and third party software add-ons for Freedom EVOware may add additional script and/or device commands to the Control Bar which are not described in this manual. In this case, refer to the instruction manual for the respective software add-on for more information.

Note: *Device commands are handled by device drivers.The currently installed devices are shown in the Control Bar. If you cannot find the device command you need even though it is listed in this chapter, you must run the Freedom EVOware installation program again to install it. Also check whether the driver has been installed but is currently deactivated (see 8.4.1.1 “Device Information Tab”, 🗎 8-21, Start checkbox).*

13.2.1 Commands for the Barcode Scanner, Overview

The following table lists the command for the Symbol LS-1220 barcode scanner.

In Freedom EVOware Plus, the Barcode Scanner command is an on-the-fly-command – drag the command to the line which connects two process steps (see 5.4.3 “The Process Editor (Freedom EVOware Plus)”, 🗎 5-17).

In Freedom EVOware Standard, proceed as follows to use the Symbol LS-1220 barcode scanner:

- Make sure that the labware type has been “allowed” for scanning with the barcode scanner (see 9.5 “Configuring Carriers”, 🗎 9-39, “Allowed Labware on this carrier”).
- Drag labware of the type you want to scan from the Control Bar (Labware section) onto the device icon of the barcode scanner.
- Use the Transfer Labware command to move the labware to the barcode scanner (the barcode scanner carrier attribute “on-the-fly” instructs Freedom EVOware not to release the labware at this position); see 15.59 “Transfer Labware Command”, 🗎 15-143;
- Add the Barcode Scanner - ReadBarcode command to your script;
- Use the Transfer Labware command to move the labware from the barcode scanner to the required destination position.

Tab. 13-12 *Commands for the Barcode Scanner*

	Read Barcode - The Read Barcode command is used to read barcodes from the labware or tube which is presented to the barcode scanner by the RoMa. See 16.2.1 “Barcode Scanner - Read Barcode Command”, 🗎 16-2.

13.2.2 Commands for the Carousel, Overview

The following table lists the commands for the Carousel. The commands PresentPlate, ReturnPlate, MoveToCartridge and EndAccess are only relevant for Freedom EVOware Standard. These actions are handled automatically in Freedom EVOware Plus.

PresentPlateByBarcode, ReturnPlateByBarcode and PreReturnPlateByBC are also only available in Freedom EVOware Standard. In Freedom EVOware Plus, you should use the *Use barcode file* option in the Runtime Controller instead (see 12.2 “Running and Optimizing a Process (Freedom EVOware Plus)”, 12-5).

Tab. 13-13 *Commands for the Carousel*

	PresentPlate - The PresentPlate command gets labware from the carousel. The labware is brought to the carousel transfer position where the plate robot can pick it up and move it away. See 16.3.1 “Carousel - PresentPlate Command”, 16-2.
	PreReturnPlateByBC - The PreReturnPlateByBC command moves the carousel’s plate handler to the carousel transfer position where it waits for the RoMa to bring the labware which you want to return to the carousel. It is used together with the ReturnPlateByBarcode command. See 16.3.2 “Carousel - PreReturnPlateByBC Command”, 16-3.
	ReturnPlate - The ReturnPlate command returns labware from the carousel transfer position to the specified tower and position in the carousel. See 16.3.3 “Carousel - ReturnPlate Command”, 16-3.
	ReturnPlateByBarcode - The ReturnPlateByBarcode command returns labware from the carousel transfer position to its original position in the carousel. See 16.3.4 “Carousel - ReturnPlateByBarcode Command”, 16-4.
	ReadAllBarcodes - The ReadAllBarcodes command reads the barcodes of all of labware in the carousel. See 16.3.5 “Carousel - ReadAllBarcodes command”, 16-5.
	InitCarousel - The InitCarousel command initializes the carousel. This needs to be executed before the carousel is first used in a process or script. See 16.3.6 “Carousel - InitCarousel Command”, 16-5.
	MoveToCartridge - The MoveToCartridge command rotates the carousel to a specified tower. See 16.3.7 “Carousel - MoveToCartridge Command”, 16-5.
	EndAccess - The EndAccess command completes the current carousel movement. This command is necessary after each PresentPlate, PresentPlateByBarcode and ReturnPlate command. See 16.3.8 “Carousel - EndAccess Command”, 16-6.
	ReadPlatesInCartridge - The ReadPlatesInCartridge command reads the barcodes of all of the labware in the specified cartridge (tower) of the carousel. See 16.3.9 “Carousel - ReadPlatesInCartridge Command”, 16-6.
	PresentPlateByBarcode - The PresentPlateByBarcode command gets the labware with the specified barcode from the carousel. The labware is brought to the carousel transfer position where the plate robot can pick it up and move it away. See 16.3.10 “Carousel - PresentPlateByBarcode Command”, 16-7.
	LoadBCFromFile - The LoadBCFromFile command reads a list of barcodes from a text file and assigns them to labware in the carousel. See 16.3.13 “Carousel - LoadBCFromFile Command”, 16-8.

13.2.3 Commands for the Carousel NT, Overview

The following table lists the commands for the Carousel NT. The commands PresentPlate, ReturnPlate and MoveToCartridge are only available in Freedom EVOware Standard. These actions are handled automatically in Freedom EVOware Plus.

PresentPlateByBC and ReturnPlateByBC are also only available in Freedom EVOware Standard. In Freedom EVOware Plus, you should use the *Use barcode file* option in the Runtime Controller instead (see 12.2 “Running and Optimizing a Process (Freedom EVOware Plus)”, 🗎 12-5).

PrePesentPlate and UndoPrePesentPlate are not relevant for (and not available in) Freedom EVOware Standard.

***Tab. 13-14** Commands for the Carousel NT*

	OpenDoorlock - The OpenDoorlock command unlocks the doorlocks of the carousel safety door. See 16.4.1 “Carousel NT - OpenDoorlock command”, 🗎 16-9.
	CloseDoorlock- The CloseDoorlock command locks the doorlocks of the carousel safety door. See 16.4.2 “Carousel NT - CloseDoorlock command”, 🗎 16-9.
	VerifyCartridges - The VerifyCartridges command is used to check that the correct cartridge types have been loaded in the carousel. See 16.4.3 “Carousel NT - VerifyCartridges command”, 🗎 16-9.
	ScanAllCartridges - The ScanAllCartridges command reads the barcodes of all of labware in the carousel. See 16.3.5 “Carousel - ReadAllBarcodes command”, 🗎 16-5.
	ScanCartridge - The ScanCartridge command reads the barcodes of all labware in the specified cartridge (tower) of the carousel. See 16.4.5 “Carousel NT - ScanCartridge Command”, 🗎 16-10.
	ScanLocation - The ScanLocation command reads the barcodes of all of the labware in the specified logical carousel. See 16.4.6 “Carousel NT - ScanLocation Command”, 🗎 16-10.
	PresentPlate - The PresentPlate command gets labware from the carousel. The labware is brought to the carousel transfer position where the plate robot can pick it up and move it away. See 16.4.7 “Carousel NT - PresentPlate Command”, 🗎 16-11.
	ReturnPlate - The ReturnPlate command returns labware from the carousel transfer position to the specified tower and position in the carousel. See 16.4.8 “Carousel NT - ReturnPlate Command”, 🗎 16-12.
	PresentPlateByBC - The PresentPlateByBC command gets the labware with the specified barcode from the carousel. The labware is brought to the carousel transfer position where the plate robot can pick it up and move it away. See 16.4.9 “Carousel NT - PresentPlateByBC Command”, 🗎 16-13.
	ReturnPlateByBC - The ReturnPlateByBC command returns labware from the carousel transfer position to its original position in the carousel. See 16.4.10 “Carousel NT - ReturnPlateByBC Command”, 🗎 16-14.

Tab. 13-14 Commands for the Carousel NT (cont.)

	MoveToCartridge - The MoveToCartridge command rotates the carousel to a specified tower. See 16.4.11 “Carousel NT - MoveToCartridge Command”, 16-14.
	PrePresentPlate - The PrePresentPlate command moves the next labware item to be processed to the carousel transfer position where it can be picked up by the robot during idle time. The robot then does not have to wait for the labware to be presented. This optimizes the movement times for the carousel. See 16.4.14 “Carousel NT - PrePresentPlate Command”, 16-15.
	UndoPrePresent - The UndoPrePresent command cancels the pre-unloading of plates. See 16.4.15 “Carousel NT - UndoPrePresent Command”, 16-16.
	LoadBCFromFile - The LoadBCFromFile command reads a list of barcodes from a text file and assigns them to labware in the carousel. See 16.4.16 “Carousel NT - LoadBCFromFile Command”, 16-16.

13.2.4 Commands for the Hettich Centrifuge, Overview

The following table lists the commands for the Hettich Centrifuge. The commands Execute2, Execute3 and Execute4 are only available in Freedom EVOware Plus.

In Freedom EVOware Standard, plates are loaded into the carousel using RoMa movement commands. For example, use two RoMa movement commands to load two plates.

In Freedom EVOware Plus, plate loading/unloading is handled automatically by the Execute command.

Tab. 13-15 Commands for the Hettich Centrifuge

	Init - The Init command initializes the centrifuge. This needs to be done before the device is first used in a script or process. See 16.5.1 “Hettich Centrifuge - Init Command”, 16-16.
	Open - The Open command opens the door of the centrifuge. See 16.5.2 “Hettich Centrifuge - Open Command”, 16-17.
	Close - The Close command closes the door of the centrifuge. See 16.5.3 “Hettich Centrifuge - Close Command”, 16-17.
	Execute1 - The Execute1 command performs the rotation procedure with one rotor position of the device occupied by labware. After the plates have been placed into the device and the door closed, the centrifuge will start rotating with the specified parameters. See 16.5.4 “Hettich Centrifuge - ExecuteN Command”, 16-17.

Tab. 13-15 Commands for the Hettich Centrifuge (cont.)

	Execute2 - The Execute2 command performs the rotation procedure with two rotor positions of the device occupied by labware. After the plates have been placed into the device and the door closed, the centrifuge will start rotating with the specified parameters. See 16.5.4 “Hettich Centrifuge - ExecuteN Command”, 16-17.
	Execute3 - The Execute3 command performs the rotation procedure with three rotor positions of the device occupied by labware. After the plates have been placed into the device and the door closed, the centrifuge will start rotating with the specified parameters. See 16.5.4 “Hettich Centrifuge - ExecuteN Command”, 16-17.
	Execute4 - The Execute4 command performs the rotation procedure with four rotor positions of the device occupied by labware. After the plates have been placed into the device and the door closed, the centrifuge will start rotating with the specified parameters. See 16.5.4 “Hettich Centrifuge - ExecuteN Command”, 16-17.
	MoveToPos - The MoveToPos command slowly turns the centrifuge rotor to align the specified bucket (rotor position) with the transfer position. After opening the door, the labware can then be removed or inserted using the RoMa. See 16.5.5 “Hettich Centrifuge - MoveToPos Command”, 16-18.

13.2.5 Commands for the Columbus Washer, Overview

The following table lists the commands for the Columbus Washer. The Status command is only available in Freedom EVOware Plus.

Tab. 13-16 Commands for the Columbus Washer

	WashPlate - The WashPlate command performs the washing of a microplate. See 16.6.1 “Columbus Washer - WashPlate command”, 16-19.
	Prime - Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure. See 16.6.2 “Columbus Washer - Prime Command”, 16-22.
	Rinse - The Rinse command starts the rinsing procedure of the washer to flush the liquid system and prevent needle blockages. Rinsing should be performed when the device is left in standby or is switched off at the end of use. See 16.6.3 “Columbus Washer- Rinse Command”, 16-23.
	Remote - The Remote command switches the device from local mode to remote mode. The device can only be controlled remotely by Freedom EVOware (through the interface cable) in remote mode. See 16.6.4 “Columbus Washer - Remote Command”, 16-24.
	ExitRemote - The ExitRemote command switches the device from remote mode to local mode. The device can not be controlled remotely by Freedom EVOware (through the interface cable) in local mode. See 16.6.5 “Columbus Washer - ExitRemote Command”, 16-24.
	Status - The Status command interrogates the status of the Columbus washer. See 16.6.6 “Columbus Washer - Status Command”, 16-24.
	Init - The Init command initializes the washer. This must be done before the washer is first used in a script or process. See 16.6.7 “Columbus Washer - Init Command”, 16-24.

Tab. 13-16 Commands for the Columbus Washer (cont.)

	StopRinse - The StopRinse command stops the currently running rinsing procedure. See 16.6.8 “Columbus Washer - StopRinse Command”, 16-25.
	StartProg - The StartProg command starts a washing program which is stored in the Columbus washer. The washer is capable of storing up to 30 user-definable washing programs. See 16.6.9 “Columbus Washer - StartProg Command”, 16-25.
	WashPlateEx - The WashPlateEx command performs the washing of a microplate. Information on the channels (liquid containers) to use with this command is read from an external text file. The washer is capable of storing up to 30 user-definable washing programs. See 16.6.10 “Columbus Washer - WashPlateEx Command”, 16-26.
	DisableAutoPrime - The DisableAutoPrime command disables the auto-priming function for the Columbus washer. Auto-priming is configured in the Columbus driver settings. See 16.6.11 “Columbus Washer - DisableAutoPrime Command”, 16-29.
	AllowAutoPrime - The AllowAutoPrime command activates the auto-priming function for the Columbus washer. Auto-priming is configured in the Columbus driver settings. See 16.6.12 “Columbus Washer - AllowAutoPrime Command”, 16-29.

13.2.6 Commands for the FlaskFlipper, Overview

The following table lists the commands for the FlaskFlipper.

Tab. 13-17 Commands for the FlaskFlipper

	ExecuteScript - The ExecuteScript command is used to execute commands for the FlaskFlipper. Most of the functions can also be executed using the other FlaskFlipper commands. See 16.7.1 “FlaskFlipper - ExecuteScript Command”, 16-30.
	LoadUnloadFlask - The LoadUnloadFlask command turns the flask flipper to the horizontal position and opens the flask holding mechanism. In this position, you can load (insert) or unload (remove) flasks using the plate robot (RoMa) or AutoLoader. See 16.7.2 “FlaskFlipper - LoadUnloadFlask Command”, 16-30.
	PrepareForPipette - The PrepareForPipette command closes the flask holding mechanism and turns the flask flipper to the vertical position. In this position, you can pipette into the flasks through the septum in the screw cap using the liquid handling arm (LiHa). See 16.7.3 “FlaskFlipper - PrepareForPipette Command”, 16-31.
	Shake - The Shake command is used to shake the flasks in the flask flipper for the purpose of distributing and mixing liquids. This is done by alternately rocking the flask flipper clockwise and counterclockwise with the specified shaking amplitude and acceleration. See 16.7.4 “FlaskFlipper - Shake Command”, 16-31.
	Knock - The Knock command moves the flask flipper to the horizontal position and knocks the flasks using a spring-loaded mechanism. This is done to detach the cell culture from the inner wall of a flask when the culture is fully grown. See 16.7.5 “FlaskFlipper - Knock Command”, 16-32.

13.2.7 Commands for the GENios Reader, Overview

The following table lists the commands for the GENios Reader. The Status command is only available in Freedom EVOware Plus.

Tab. 13-18 Commands for the GENios Reader

	Status - The Status command interrogates the status of the reader. See 16.8.1 “GENios Reader - Status Command”, 16-33.
	Excitation Out - The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged. See 16.8.2 “GENios Reader - Excitation Out Command”, 16-33.
	Emission Out - The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged. See 16.8.3 “GENios Reader - Emission Out Command”, 16-33.
	Open - The Open command opens the door of the reader. See 16.8.4 “GENios Reader - Open Command”, 16-33.
	Close - The Close command closes the door of the reader. See 16.8.5 “GENios Reader - Close Command”, 16-33.
	Measure - The Measure command performs a measurement procedure using external software which is controlled by external software. See 16.8.6 “GENios Reader - Measure Command”, 16-34.
	Multilabel - The Multilabel command performs up to four consecutive measurement steps on the same plate using external software. The plate does not have to leave the reader in between measurements. See 16.8.7 “GENios Reader - Multilabel Command”, 16-34.

13.2.8 Commands for the GENios Pro Reader, Overview

The following table lists the commands for the GENios Pro Reader. The Status command is only available in Freedom EVOware Plus.

Tab. 13-19 Commands for the GENios Pro Reader

	Status - The Status command interrogates the status of the reader. See 16.9.1 “GENios Pro Reader - Status Command”, 16-36.
	Excitation Out - The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged. See 16.9.2 “GENios Pro Reader - Excitation Out Command”, 16-36.
	Emission Out - The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged. See 16.9.3 “GENios Pro Reader - Emission Out Command”, 16-36.
	Open - The Open command opens the door of the reader. See 16.9.4 “GENios Pro Reader - Open Command”, 16-37.
	Close - The Close command closes the door of the reader. See 16.9.5 “GENios Pro Reader - Close Command”, 16-37.

Tab. 13-19 Commands for the GENios Pro Reader (cont.)

	Measure - The Measure command performs a measurement procedure using external software. See 16.9.6 “GENios Pro Reader - Measure Command”, 16-37.
	Multilabel - The Multilabel command performs up to four consecutive measurement steps on the same plate using external software. The plate does not have to leave the reader in between measurements. See 16.9.7 “GENios Pro Reader - Multilabel Command”, 16-38.
	PrimeManual - The PrimeManual command executes the priming procedure, which fills the injectors with fluid, if the reader is equipped with the injector option. See 16.9.8 “GENios Pro Reader - PrimeManual Command”, 16-39.
	DispenseManual - The DispenseManual command dispenses fluid from the injectors, if the reader is equipped with the injector option. See 16.9.9 “GENios Pro Reader - DispenseManual Command”, 16-39.

13.2.9 Commands for the Heated Incubator, Overview

The following table lists the commands for the Heated Incubator. Freedom EVOware in the standard configuration lets you configure up to three logical incubators, each of them with a different temperature (see 8.5.8 “Settings for Heated Incubators 1 to 3”, 8-55).

Use the Duplicate Device tool if you need more than three (see A.9.3 “Duplicate Device Tool”, A-36).

The commands CloseDoor, StartShaker, StopShaker, InsertPlate and RemovePlate are only available in Freedom EVOware Standard. Plates are loaded into the incubator using RoMa movement commands. Use the Wait For Timer command to control the incubating time.

Use the Incubate command instead in Freedom EVOware Plus (the Incubate command handles all of these actions, including incubating time and plate loading/unloading, automatically).

Tab. 13-20 Commands for the Heated Incubator

	Incubate - The Incubate command incubates the labware inside the incubator for the specified amount of time. See 16.10.1 “Heated Incubator - Incubate Command”, 16-40.
	SetTemperature - The SetTemperature command sets the specified slot of the incubator to the chosen temperature. See 16.10.7 “Heated Incubator - SetTemperature Command”, 16-43.
	CloseDoor- The CloseDoor command closes all of the doors of the incubator. To maintain a constant temperature within the incubator, it is best to close the doors again directly after inserting or removing labware. See 16.10.2 “Heated Incubator - CloseDoor Command”, 16-40.

Tab. 13-20 Commands for the Heated Incubator (cont.)

	StartShaker - The StartShaker command starts the optional shaker of the incubator. See 16.10.3 “Heated Incubator - StartShaker Command”, 16-41.
	StopShaker - The StopShaker command stops the optional shaker of the incubator. See 16.10.4 “Heated Incubator - StopShaker Command”, 16-41.
	InsertPlate - The InsertPlate command must be used each time the RoMa inserts labware into the incubator slot. The InsertPlate command itself does not move the labware. It’s purpose is to regulate the power of the slot’s heater. See 16.10.5 “Heated Incubator - InsertPlate Command”, 16-41.
	RemovePlate - The RemovePlate command must be used each time the RoMa removes labware from the incubator slot. The RemovePlate command itself does not move the labware. It’s purpose is to tell Freedom EVOware to stop recording information on the slot temperature to the log file. See 16.10.6 “Heated Incubator - RemovePlate Command”, 16-42.

13.2.10 Commands for the Base Incubator, Overview

The following table lists the command for the Base Incubator. The Base Incubator is a software concept and it is not a device which you can fit to your pipetting instrument. This command is not necessary in Freedom EVOware Standard.

Tab. 13-21 Commands for the Base Incubator

	BaseIncubate - The BaseIncubate command moves the labware back to its base (labware source) position (e.g. the carousel) and leaves it there at room temperature for the specified amount of time. The base incubator is a software concept and it is not a device which you can fit to your pipetting instrument. See 16.11.1 “Base Incubator - BaseIncubate Command”, 16-44.

13.2.11 Commands for the Room Temperature Incubator, Overview

The following table lists the command for the Room Temperature Incubator, which is only available in Freedom EVOware Plus. The Incubate command handles incubating time and plate loading/unloading automatically.
This command is not available in Freedom EVOware Standard. The labware is loaded into the room temperature incubator using RoMa movement commands. The incubating time can then be controlled by the Wait For Timer command.

Tab. 13-22 Commands for the Room Temperature Incubator

	Incubate - The Incubate command keeps the labware at room temperature for the specified amount of time. See 16.12.1 “Room Temperature Incubator - Incubate Command”, 16-45.

13.2.12 Commands for the Liquid Handling Arm (LiHa), Overview

The following table lists the device commands for the Liquid Handling Arm (LiHa). These commands are only available in Freedom EVOware Plus. They are not

necessary in Freedom EVOware Standard - all of the required functions are provided by the Liquid Handling Arm script commands.

Tab. 13-23 *Commands for the Liquid Handling Arm (LiHa)*

	Flush RSP - The Flush RSP command uses a wash station to flush the dilutors and the tubing of the pipetting instrument (fill them with system liquid) and to flush and wash the tips on the LiHa. It is mainly intended as a service function. See 16.13.1 “Liquid Handling Arm - Flush RSP Command”, 16-46.
	Pipette - The Pipette command is used to create a pipetting script. When you drag it to the Process Editor, it opens the Script Editor automatically. See 16.13.2 “Liquid Handling Arm - Pipette Command”, 16-47. See also 11.4.2 “Creating a Pipetting Script”, 11-5.

13.2.13 Commands for the Multi Channel Arm (MCA) Overview

The following table lists the device commands for the Multi Channel Arm (MCA). These commands are only available in Freedom EVOware Plus. They are not necessary in Freedom EVOware Standard - all of the required functions are provided by the Multi Channel Arm script commands.

Tab. 13-24 *Commands for the Multi Channel Arm (MCA)*

	Pipette - The Pipette command is used to create a pipetting script. When you drag it to the Process Editor, it opens the Script Editor automatically. See 16.14.1 “MCA96 - Pipette Command”, 16-48. See also 11.4.2 “Creating a Pipetting Script”, 11-5.

13.2.14 Commands for the MCA384 (Multi Channel Arm) Overview

The following table lists the device commands for the Multi Channel Arm (MCA). These commands are only available in Freedom EVOware Plus. They are not necessary in Freedom EVOware Standard - all of the required functions are provided by the Multi Channel Arm script commands.

Tab. 13-25 *Commands for the MCA384 (Multi Channel Arm)*

	Pipette - The Pipette command is used to create a pipetting script. When you drag it to the Process Editor, it opens the Script Editor automatically. See 16.14.1 “MCA96 - Pipette Command”, 16-48. See also 11.4.2 “Creating a Pipetting Script”, 11-5.

13.2.15 Commands for the Magellan option, Overview

The following table lists the Freedom EVOware commands for the Tecan Magellan option, which must be installed separately. The Magellan software is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. The Status command is only available in Freedom EVOware Plus.

Tab. 13-26 Commands for the Magellan option

	Status - The Status command interrogates the status of the reader. See 16.16.1 “Magellan - Status Command”, 16-48.
	Excitation Out - The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged. See 16.16.2 “Magellan - Excitation Out Command”, 16-49.
	Emission Out - The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged. See 16.16.3 “Magellan - Emission Out Command”, 16-49.
	Open - The Open command opens the door of the currently active reader. See 16.16.4 “Magellan - Open Command”, 16-49.
	Close - The Close command closes the door of the currently active reader. See 16.16.5 “Magellan - Close Command”, 16-49.
	Measure - The Measure command performs a measurement procedure using the Magellan software. See 16.16.6 “Magellan - Measure Command”, 16-49.

13.2.16 Commands for the PW384 Washer, Overview

The following table lists the commands for the PW384 Washer. The Status command is only available in Freedom EVOware Plus.

Tab. 13-27 Commands for the PW384 Washer

	Status - The Status command interrogates the status of the washer. See 16.17.1 “PW384 Washer - Status Command”, 16-52.
	Prime - Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure. See 16.17.2 “PW384 Washer - Prime Command”, 16-52.
	Rinse - The Rinse command starts the rinsing procedure of the washer to flush the liquid system. See 16.17.3 “PW384 Washer - Rinse Command”, 16-52.
	Wash - The Wash command performs the washing of a microplate by executing a wash program which is stored in the washer. See 16.17.4 “PW384 Washer - Wash Command”, 16-52.
	Stop - The Stop command stops the washing procedure. See 16.17.5 “PW384 Washer - Stop Command”, 16-53.
	PrepareEmptyWaste - The PrepareEmptyWaste command collapses the vacuum in the waste bottle to allow it to be emptied. This needs to be done whenever the washer’s liquid detection indicates that the waste bottle is full. See 16.17.6 “PW384 Washer - PrepareEmptyWaste Command”, 16-53.

13.2.17 Commands for the PW384 GP Washer, Overview

The following table lists the commands for the PW384 GP Washer.

Tab. 13-28 Commands for the PW384 GP Washer

	Aspirate - The Aspirate command starts the aspiration procedure of the washer. It is mainly intended for special applications, e.g. to remove sample or reagent liquids from the wells. See 16.18.1 “PW384GP Washer - Aspirate Command”, 16-54.
	Dispense - The Dispense command starts the liquid dispensing procedure of the washer. It is mainly intended for special applications, e.g. to fill the wells with liquid. See 16.18.2 “PW384GP Washer - Dispense Command”, 16-55.
	Prime - Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure. See 16.18.3 “PW384GP Washer - Prime Command”, 16-57.
	Rinse - The Rinse command starts the rinsing procedure of the washer to flush the liquid system. See 16.18.4 “PW384GP Washer - Rinse Command”, 16-57.
	Stop - The Stop command stops the washing procedure. See 16.18.5 “PW384GP Washer - Stop Command”, 16-58.
	PrepareEmptyWaste - The PrepareEmptyWaste command collapses the vacuum in the waste bottle to allow it to be emptied. This needs to be done whenever the washer’s liquid detection indicates that the waste bottle is full. See 16.18.6 “PW384GP Washer - PrepareEmptyWaste Command”, 16-59.
	DownloadWash - The PW384GP washer can store parameter sets for up to 49 different wash programs. The DownloadWash command is used to configure a wash program and download it to non-volatile memory in the washer. The stored wash program can then be executed with the StartWash command. See 16.18.7 “PW384GP Washer - DownloadWash Command”, 16-59.
	StartWash - The PW384GP washer can store parameter sets for up to 49 different wash programs. The StartWash command is used to execute one of the stored wash programs. See 16.18.8 “PW384GP Washer - StartWash Command”, 16-62.
	Wash - The Wash command performs the washing of a microplate with specified parameters such as wash volume and aspiration time. See 16.18.9 “PW384GP Washer - Wash Command”, 16-62.

13.2.18 Commands for the 96PW Washer, Overview

The following table lists the commands for the 96PW washer. The Status command is only available in Freedom EVOware Plus.

Tab. 13-29 Commands for the 96PW washer

	WashPlate - The WashPlate command performs the washing of a microplate with specified parameters such as wash volume and aspiration time. See 16.19.1 “96PW Washer - WashPlate Command”, 16-66.
	Dispense - The Dispense command starts the liquid dispensing procedure of the washer. It is mainly intended for special applications, e.g. to fill the wells with liquid. See 16.19.2 “96PW Washer - Dispense Command”, 16-67.
	Aspirate - The Aspirate command starts the aspiration procedure of the washer. It is mainly intended for special applications, e.g. to remove sample or reagent liquids from the wells. See 16.19.3 “96PW Washer - Aspirate Command”, 16-68.
	Prime - Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure. See 16.19.4 “96PW Washer - Prime Command”, 16-68.
	Rinse - The Rinse command starts the rinsing procedure of the washer to flush the liquid system. See 16.19.5 “96PW Washer - Rinse Command”, 16-69.
	Remote - The Remote command switches the device from local mode to remote mode. The device can only be controlled remotely by Freedom EVOware (through the interface cable) in remote mode. See 16.19.6 “96PW Washer - Remote Command”, 16-69.
	ExitRemote - The ExitRemote command switches the device from remote mode to local mode. The device can not be controlled remotely by Freedom EVOware (through the interface cable) in local mode. See 16.19.7 “96PW Washer - ExitRemote Command”, 16-70.
	Status - The Status command interrogates the status of the washer. See 16.19.8 “96PW Washer - Status Command”, 16-70.

13.2.19 Commands for the PosID-3, Overview

The following table lists the command for the PosID-3 movable barcode scanner. The PosID (the previous version of the PosID-3 hardware) uses script commands instead of device commands. If your pipetting instrument is fitted with the PosID instead of the PosID-3, the PosID group of the Control Bar will not contain any commands. The PosID script commands can be found in the Identification Devices group.

Tab. 13-30 Commands for the PosID-3

	Initialize - The Initialize command initializes the PosID-3. This needs to be done before the PosID-3 is first used in a script or process. See 16.20.1 “PosID-3 - Initialize Command”, 16-70.
	Scan - The Scan command is used to read the barcode labels on one or more pieces of labware using the PosID-3 option. The PosID-3 (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. See 16.20.2 “PosID-3 - Scan Command”, 16-70.

13.2.20 Commands for the REMP PHS, Overview

The following table lists the command for the REMP PHS (Portrait Heat Sealer). The REMP PHS is used to heat seal microplates using a special REMP sealing foil.

***Tab. 13-31** Commands for the REMP PHS*

	SealPlate - The SealPlate command applies the sealing foil to the microplate using heat and pressure. The plate feeder mechanism removes the microplate from the device again after sealing. See 16.21.1 “REMP PHS - SealPlate Command”, 16-74.

13.2.21 Commands for the REMP Reatrix, Overview

The following table lists the commands for the REMP Reatrix. The REMP Reatrix is used to scan the 2D tube barcodes and the tube rack barcode of REMP STBR96 tube racks.

***Tab. 13-32** Commands for the REMP Reatrix*

	Read - The Read command reads the 2D tube barcodes and the tube rack barcode of the REMP STBR96 tube rack which has been placed on the Reatrix barcode scanner. See 16.22.1 “REMP Reatrix - Read Command”, 16-76.
	Initialize - The Initialize command initializes the REMP Reatrix. This needs to be done before the REMP Reatrix is first used in a script or process. See 16.22.2 “REMP Reatrix - Initialize Command”, 16-77.

13.2.22 Commands for the REMP ACD96, Overview

The following table lists the commands for the REMP ACD96 (Automated Capper Decapper). The REMP ACD96 is used to fit or remove sealing caps from REMP tubes in REMP STBR96 tube racks.

***Tab. 13-33** Commands for the REMP ACD96*

	Cap - The Cap command fits caps to 96 REMP tubes in the REMP STBR96 tube rack. Before fitting the caps, they are held by a mechanism inside the ACD96. See 16.23.1 “REMP ACD96 - Cap Command”, 16-78.
	Decap - The Decap command removes the caps from 96 REMP tubes in the REMP STBR96 tube rack. After removing the caps, they are held by a mechanism inside the ACD96. See 16.23.2 “REMP ACD96 - Decap Command”, 16-78.

13.2.23 Commands for the Tube Robot, Overview

The following table lists the command for the Tube Robot. This device command is only available in Freedom EVOware Plus. It is not necessary in Freedom EVOware Standard - all of the required functions are provided by the Tube Robot script commands.

Tab. 13-34 Commands for the Tube Robot

	ExecuteScript - The ExecuteScript command is used to write a script for tube handling. When you drag it to the Process Editor, it opens the Script Editor automatically. See 16.25.1 “Tube Robot - ExecuteScript Command”, 16-83. See also 11.4.2 “Creating a Pipetting Script”, 11-5.

13.2.24 Commands for the Process Starter, Overview

The following table lists the commands for the Process Starter device driver. These commands are only available in Freedom EVOware Plus.

The Start command is available in five versions (Start and StartP1 to StartP4) depending on the number of labware items required by the processes you want to start (0 to 4 labware items).

You can only use StartP1 to StartP4 as process steps. The Start command can be used as a process step or in scripts for the Process Script - Script command. The WaitForProcess commands can only be used in scripts for the Process Script - Script command (see 16.39.1 “Process Script - Script Command”, 16-127).

Tab. 13-35 Commands for the Process Starter

	Start - The Start command starts a single instance of a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations and/or on the values of variables. See 16.24.1 “Process Starter - Start Command”, 16-78.
	WaitForProcess - The WaitForProcess script command waits for a specified process to finish before allowing the pipetting script to continue. See 16.24.2 “Process Starter - WaitForProcess Command”, 16-82.

13.2.25 Commands for the Plate Robot, Overview

The following table lists the commands for the Plate Robot. These commands are only available in Freedom EVOware Plus and are mainly intended for special applications. Plate Robot (RoMa movement) commands are normally used as pre-actions and/or post-actions of other commands and are not normally used as process steps.

in Freedom EVOware Standard, RoMa movements are specified with the script commands Move RoMa, RoMa Vector and Transfer Labware.

Tab. 13-36 Commands for the Plate Robot

	ExecuteSingleVector - The ExecuteSingleVector command executes a predefined movement from one position on the worktable to another (a RoMa vector). See 16.26.1 “Plate Robot - ExecuteSingleVector Command”, 16-84.
	Initialize - The Initialize command initializes the plate robot. This needs to be executed before the robot is first used in a script or process. See 16.26.2 “Plate Robot - Initialize Command”, 16-85.
	MoveObject- The MoveObject command moves an object (plate) to a specified location. See 16.26.3 “Plate Robot - MoveObject Command”, 16-85.
	ReplaceObject - The ReplaceObject command moves an object to a specified location. If the destination is occupied, the blocking object will be removed. It is mainly used for moving reagent carriers. See 16.26.4 “Plate Robot - ReplaceObject Command”, 16-85.
	MoveToBase - The MoveToBase command moves an object (plate) to its base (labware source) position. See 16.26.5 “Plate Robot - MoveToBase Command”, 16-85.
	ChangeObject - The ChangeObject command moves an object to a specified location. If the destination is occupied, the blocking object will be removed. It is only used for changing DiTi’s. See 16.26.6 “Plate Robot - ChangeObject Command”, 16-86.
	MoveInsert - The MoveInsert command moves the insert of an Insert Plate to the specified location. See 16.26.7 “Plate Robot - MoveInsert Command”, 16-86.
	SwapInsert - The SwapInsert command moves the insert of an Insert plate to an Insert plate which doesn’t have an insert. See 16.26.8 “Plate Robot - SwapInsert Command”, 16-86.
	ClearLocation - The ClearLocation command moves all objects which are currently at the specified location to a new location. See 16.26.9 “Plate Robot - ClearLocation Command”, 16-86.

13.2.26 Commands for the Safire Reader, Overview

The following table lists the commands for the Safire Reader. The Status command is only available in Freedom EVOware Plus.

Tab. 13-37 Commands for the Safire Reader

	Status - The Status command interrogates the status of the reader. See 16.27.1 “Safire Reader - Status Command”, 16-87.

Tab. 13-37 Commands for the Safire Reader (cont.)

	Open - The Open command opens the door of the reader. See 16.27.2 “Safire Reader - Open Command”, 16-87.
	Close - The Close command closes the door of the reader. See 16.27.3 “Safire Reader - Close Command”, 16-87.
	Measure - The Measure command performs a measurement procedure using external software. See 16.27.4 “Safire Reader - Measure Command”, 16-87.
	Multilabel - The Multilabel command performs up to four consecutive measurement steps on the same plate using external software. The plate does not have to leave the reader in between measurements. See 16.27.5 “Safire Reader - Multilabel Command”, 16-88.

13.2.27 Commands for the Te-Shake Shaker, Overview

The following table lists the commands for the Te-Shake Shaker.

The commands Init, Start, Stop, SetTemperature and SetFrequency are only available in Freedom EVOware Standard. Plates are loaded into the Te-Shake using RoMa movement commands. The shaking time can be controlled by the Wait For Timer command.

Use the Shake command instead in Freedom EVOware Plus (the Shake command handles all of these actions, including shaking time and plate loading/unloading, automatically). The Shake command is not available in Freedom EVOware Standard.

Freedom EVOware is provided with several different types of Te-Shake shaker. If you want to use more than one shaker in your script or process, you must use the Duplicate Device tool top create a separate device driver for each of them. For more information see 16.28 “Commands for the Te-Shake Shaker”, 16-90.

Tab. 13-38 Commands for the Te-Shake Shaker

	Init - The Init command initializes the shaker. This needs to be done before the shaker is first used in a script or process. See 16.28.1 “Te-Shake shaker - Init Command”, 16-90.
	Shake - The Shake command performs the shaking procedure with the specified direction, frequency and temperature. See 16.28.2 “Te-Shake shaker - Shake Command”, 16-90.
	Start - The Start command starts the shaking procedure. See 16.28.3 “Te-Shake shaker - Start Command”, 16-92.
	Stop - The Stop command stops the shaking procedure. See 16.28.4 “Te-Shake shaker - Stop Command”, 16-92.
	SetTemperature - The SetTemperature command sets the shaker to the specified temperature. See 16.28.5 “Te-Shake shaker - SetTemperature Command”, 16-92.
	SetFrequency - The SetFrequency command set the shaking frequency of the shaker. See 16.28.6 “Te-Shake shaker - SetFrequency Command”, 16-93.

13.2.28 Commands for the Symbol MS-954 Barcode Scanner, Overview

The following table lists the command for the Symbol MS-954 barcode scanner. In Freedom EVOware Plus, the Barcode Scanner command is an on-the-fly-command – drag the command to the line which connects two process steps (see 5.4.3 “The Process Editor (Freedom EVOware Plus)”, 🗎 5-17).

In Freedom EVOware Standard, proceed as follows to use the Symbol MS-954 barcode scanner:

- Make sure that the labware type has been “allowed” for scanning with the barcode scanner (see 9.5 “Configuring Carriers”, 🗎 9-39, “Allowed Labware on this carrier”).
- Drag labware of the type you want to scan from the Control Bar (Labware section) onto the device icon of the Symbol MS-954 barcode scanner.
- Use the Transfer Labware command to move the labware to the barcode scanner (the barcode scanner carrier attribute “on-the-fly” instructs Freedom EVOware not to release the labware at this position); see 15.59 “Transfer Labware Command”, 🗎 15-143;
- Add the Barcode Scanner - ReadBarcode command to your script;
- Use the Transfer Labware command to move the labware from the barcode scanner to the required destination position.

Tab. 13-39 *Commands for the Symbol MS-954 Barcode Scanner*

	Read Barcode - The Read Barcode command is used to read barcodes from the labware or tube which is presented to the barcode scanner by the RoMa. See 16.29.1 “Symbol MS-954 Barcode Scanner - Read Barcode Command”, 🗎 16-94.

13.2.29 Commands for the Spectra Fluor Reader, Overview

The following table lists the commands for the Spectra Fluor Reader. The Status command is only available in Freedom EVOware Plus.

Tab. 13-40 *Commands for the Spectra Fluor Reader*

	Status - The Status command interrogates the status of the reader. See 16.30.1 “Spectra Fluor Reader - Status Command”, 🗎 16-94.
	Excitation Out - The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged. See 16.30.2 “Spectra Fluor Reader - Excitation Out Command”, 🗎 16-95.
	Emission Out - The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged. See 16.30.3 “Spectra Fluor Reader - Emission Out Command”, 🗎 16-95.

Tab. 13-40 Commands for the Spectra Fluor Reader (cont.)

	Open - The Open command opens the door of the reader. See 16.30.4 “Spectra Fluor Reader - Open Command”, 16-95.
	Close - The Close command closes the door of the reader. See 16.30.5 “Spectra Fluor Reader - Close Command”, 16-95.
	Measure - The Measure command performs a measurement procedure using external software. See 16.30.6 “Spectra Fluor Reader - Measure Command”, 16-95.
	Multilabel - The Multilabel command performs up to four consecutive measurement steps on the same plate using external software. The plate does not have to leave the reader in between measurements. See 16.30.7 “Spectra Fluor Reader - Multilabel Command”, 16-96.

13.2.30 Commands for the Sunrise Reader, Overview

The following table lists the commands for the Sunrise Reader. The Status command is only available in Freedom EVOware Plus.

Tab. 13-41 Commands for the Sunrise Reader

	Status - The Status command interrogates the status of the reader. See 16.31.1 “Sunrise Reader - Status Command”, 16-98.
	Open - The Open command opens the door of the reader. See 16.31.2 “Sunrise Reader - Open Command”, 16-98.
	Close - The Close command closes the door of the reader. See 16.31.3 “Sunrise Reader - Close Command”, 16-98.
	Measure - The Measure command performs a measurement procedure using external software. See 16.31.4 “Sunrise Reader - Measure Command”, 16-98.
	Multilabel - The Multilabel command performs up to four consecutive measurement steps on the same plate using external software. The plate does not have to leave the reader in between measurements. See 16.31.5 “Sunrise Reader - Multilabel Command”, 16-99.

13.2.31 Commands for the Magnetic Bead Separator (Te-MagS), Overview

The following table lists the commands for the Magnetic Bead Separator.

Tab. 13-42 Commands for the Magnetic Bead Separator

	MoveToPosition - The MoveToPosition command moves the carrier to one of four positions. You must specify the required position. See 16.32.1 “Magnetic Bead Separator - MoveToPosition Command”, 16-100.
	ActivateHeater - The ActivateHeater command is used to switch on the heater. You must specify the required temperature. See 16.32.2 “Magnetic Bead Separator - ActivateHeater Command”, 16-101.
	DeactivateHeater - The DeactivateHeater command is used to switch off the heater when you no longer want to use it. See 16.32.3 “Magnetic Bead Separator - DeactivateHeater Command”, 16-102.
	Execution - The Execution command lets you specify the sequence of operations to be carried out by the Magnetic Bead Separator (Te-MagS) during the separation process. See 16.32.4 “Magnetic Bead Separator - Execution Command”, 16-102.

13.2.32 Commands for the Te-Stack Te-MO, Overview

The following table lists the commands for the Te-Stack Te-MO stacker. The commands DropPlate and GetPlate are only available in Freedom EVOware Standard. These actions are handled automatically in Freedom EVOware Plus.
The MoveObject command in Freedom EVOware Plus is only intended for special applications.

Tab. 13-43 Commands for the Te-Stack Te-MO stacker

	InitStacker - The InitStacker command initializes the Te-Stack Te-MO. This needs to be done before the stacker is first used in a process or script. See 16.33.1 “Te-Stack Te-MO - InitStacker Command”, 16-105.
	MoveObject - The MoveObject command moves a plate to a site on one of the Te-MO slides. This command is provided for special applications; it is not normally used as a process step. See 16.33.2 “Te-Stack Te-MO - MoveObject Command”, 16-105.
	DropPlate - The DropPlate command gets a plate from the specified Te-Stack tower and puts in on the specified Te-MO site. See 16.33.3 “Te-Stack Te-MO - DropPlate Command”, 16-106.
	GetPlate - The GetPlate command gets a plate from the specified Te-MO site and returns it to the specified Te-Stack tower. See 16.33.4 “Te-Stack Te-MO - GetPlate Command”, 16-106.

13.2.33 Commands for the Te-Stack, Overview

The following table lists the commands for the Te-Stack stacker. The commands ReturnPlate, PrepareReturnPlate and PresentPlate are only available in Freedom EVOware Standard. These actions and plate loading/unloading are handled automatically in Freedom EVOware Plus.
The MoveObject command in Freedom EVOware Plus is only intended for special applications.

Tab. 13-44 Commands for the Te-Stack stacker

	InitStacker - The InitStacker command initializes the Te-Stack. This needs to be done before the stacker is first used in a process or script. See 16.34.1 “Te-Stack - InitStacker Command”, 16-108.
	MoveObject - The MoveObject command moves a plate to the Te-Stack transfer position. This command is provided for special applications; it is not normally used as a process step. See 16.34.2 “Te-Stack - MoveObject Command”, 16-108.
	ReturnPlate - The ReturnPlate command returns a plate from the Te-Stack transfer position to the specified tower. See 16.34.3 “Te-Stack - ReturnPlate Command”, 16-108.
	PrepareReturnPlate - The PrepareReturnPlate command moves the Te-Stack shuttle to the Te-Stack transfer position, e.g. to wait for the RoMa to bring a plate. After the RoMa has brought the plate, the ReturnPlate command can then be used to return the plate to the specified stacker tower. See 16.34.4 “Te-Stack - PrepareReturnPlate Command”, 16-109.
	PresentPlate - The PresentPlate command gets a plate from the specified tower and brings it to the Te-Stack transfer position, where the robot can pick it up and move it away. See 16.34.5 “Te-Stack - PresentPlate Command”, 16-109.

13.2.34 Commands for the Vacuum Separator (Te-VacS), Overview

The following table lists the commands for the vacuum separator.

The commands Filtration, CheckWasteLevel and CheckPlateWithBlock are only available in Freedom EVOware Plus.

To carry out vacuum separation in Freedom EVOware Standard you must use a combination of the commands SetPressureDiff, ApplyVacuumRear, ApplyVacuumFront, VentRear, VentFront, PositionPlateRear, PositionPlateFront and OpenDesaltingValve. The Filtration command in Freedom EVOware Plus is a high-level command which combines all of these functions.

Tab. 13-45 Commands for the Te-VacS

	SetPressureDiff- The SetPressureDiff command This option starts the vacuum pump. You must specify the required vacuum. The vacuum is not applied to either of the SPE blocks and the script or process does not wait for the vacuum to build up. See 16.35.1 “Te-VacS - SetPressureDiff Command”, 16-110.
	ApplyVacuumRear - The ApplyVacuumRear command applies the vacuum to the rear SPE block (i.e. the SPE block which is connected to vacuum pipe 2). You must specify the required vacuum. See 16.35.2 “Te-VacS - ApplyVacuumRear Command”, 16-111.
	ApplyVacuumFront - The ApplyVacuumFront command applies the vacuum to the front SPE block (i.e. the SPE block which is connected to vacuum pipe 1). You must specify the required vacuum. See 16.35.3 “Te-VacS - ApplyVacuumFront Command”, 16-111.
	VentRear - The VentRear command vents the vacuum from the rear SPE block. It is used to stop the solid phase extraction process. See 16.35.4 “Te-VacS - VentRear Command”, 16-112.

Tab. 13-45 Commands for the Te-VacS (cont.)

	VentFront - The VentFront command vents the vacuum from the front SPE block. It is used to stop the solid phase extraction process. See 16.35.5 “Te-VacS - VentFront Command”, 16-112.
	DeactivateSystem - The DeactivateSystem command is used to shut down the Te-VacS when you no longer want to use it in your script or process. It switches off the vacuum pump and vents all blocks and the vacuum tank. See 16.35.6 “Te-VacS - DeactivateSystem Command”, 16-112.
	CheckWasteLevel - The CheckWasteLevel command is used to check the liquid level in the waste bottle. The waste level is reported during process runtime in the Messages/Error window of the runtime controller. See 16.35.7 “Te-VacS - Check-WasteLevel Command”, 16-112.
	CheckPlateWithBlock - If a plate has been put on the vacuum block and a RoMa movement command has moved the vacuum block, the CheckPlateWithBlock command is used to inform Freedom EVOware that the plate has moved too. See 16.35.8 “Te-VacS - CheckPlateWithBlock Command”, 16-112.
	Filtration - The Filtration command is used to specify the sequence of operations to be carried out by the Te-VacS during the vacuum separation process. See 16.35.9 “Te-VacS - Filtration Command”, 16-113.
	PositionPlateRear - The PositionPlateRear command is only relevant if the Te-VacS is fitted with the Repositioner option. It moves the collection plate for the rear vacuum block into one of four positions before you apply the vacuum. See 16.35.9 “Te-VacS - Filtration Command”, 16-113.
	PositionPlateFront - The PositionPlateFront command is only relevant if the Te-VacS is fitted with the Repositioner option. It moves the collection plate for the front vacuum block into one of four positions before you apply the vacuum. See 16.35.9 “Te-VacS - Filtration Command”, 16-113.
	OpenDesaltingValve - The OpenDesaltingValve command opens the desalter valve to drain the residues. It is only relevant for Te-VacS versions which are equipped with a desalter valve. See 16.35.9 “Te-VacS - Filtration Command”, 16-113.

13.2.35 Commands for the Te-MO, Overview

The following table lists the commands for the Multi Pipetting Head. These device commands are only available in Freedom EVOware Plus. They are not necessary in Freedom EVOware Standard - all of the required functions are provided by the Multi Pipetting Head script commands.

Tab. 13-46 Commands for the Te-MO

	Init - The Init command initializes the Te-MO. This needs to be done before the Te-MO is first used in a process or script. See 16.36.1 “Te-MO - Init Command”, 16-120.
	Pipette - The Pipette command is used to create a pipetting script for the Te-MO. When you drag it to the Process Editor, it opens the Script Editor automatically. See 16.36.2 “Te-MO - Pipette Command”, 16-120. See also 11.4.2 “Creating a Pipetting Script”, 11-5.

13.2.36 Commands for the Ultra Reader, Overview

The following table lists the commands for the Ultra Reader. The Status command is only available in Freedom EVOware Plus.

Tab. 13-47 *Commands for the Ultra Reader*

	Status - The Status command interrogates the status of the reader. See 16.37.1 “Ultra Reader - Status Command”, 16-120.
	Excitation Out - The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged. See 16.37.2 “Ultra Reader - Excitation Out Command”, 16-120.
	Emission Out - The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged. See 16.37.3 “Ultra Reader - Emission Out Command”, 16-121.
	Open - The Open command opens the door of the reader. See 16.37.4 “Ultra Reader - Open Command”, 16-121.
	Close - The Close command closes the door of the reader. See 16.37.5 “Ultra Reader - Close Command”, 16-121.
	Measure - The Measure command performs a measurement procedure using external software. See 16.37.6 “Ultra Reader - Measure Command”, 16-121.
	Multilabel - The Multilabel command performs up to four consecutive measurement steps on the same plate using external software. The plate does not have to leave the reader in between measurements. See 16.37.7 “Ultra Reader - Multilabel Command”, 16-122.

13.2.37 Commands for the Ultra Evolution Reader, Overview

The following table lists the commands for the Ultra Evolution Reader. The Status command is only available in Freedom EVOware Plus.

Tab. 13-48 *Commands for the Ultra Evolution Reader*

	Status - The Status command interrogates the status of the reader. See 16.38.1 “Ultra Evolution Reader - Status Command”, 16-123.
	Excitation Out - The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged. See 16.38.2 “Ultra Evolution Reader - Excitation Out Command”, 16-124.
	Emission Out - The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged. See 16.38.3 “Ultra Evolution Reader - Emission Out Command”, 16-124.

Tab. 13-48 Commands for the Ultra Evolution Reader (cont.)

	Open - The Open command opens the door of the reader. See 16.38.4 “Ultra Evolution Reader - Open Command”, 16-124.
	Close - The Close command closes the door of the reader. See 16.38.5 “Ultra Evolution Reader - Close Command”, 16-124.
	Measure - The Measure command performs a measurement procedure using external software. See 16.38.6 “Ultra Evolution Reader - Measure Command”, 16-124.
	Multilabel - The Multilabel command performs up to four consecutive measurement steps on the same plate using external software. The plate does not have to leave the reader in between measurements. See 16.38.7 “Ultra Evolution Reader - Multilabel Command”, 16-125.

13.2.38 Commands for the Process Script, Overview

The following table lists the command for the Process Script device driver. This command is only available in Freedom EVOware Plus.

Tab. 13-49 Commands for the Process Starter

	Script - The Script command is used to create a script for the Process Starter script commands. When you drag it to the Process Editor, it opens the Script Editor automatically. See 16.39.1 “Process Script - Script Command”, 16-127.

13.2.39 Commands for the Transfer Station, Overview

The following table lists the command for the Transfer Station. The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, this location is used to transfer labware from one RoMa to another. The Transfer command is only installed if you have installed Freedom EVOware with two RoMas.

Tab. 13-50 Commands for the Transfer Station

	Transfer - The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, the Transfer command uses the Transfer Station to pass labware from one RoMa to the other if this becomes necessary. See 16.40.1 “Transfer Station - Transfer Command”, 16-127.

13.2.40 Commands for the Te-Link, Overview

The following table lists the command for the Te-Link transfer rail.
This command is only available in Freedom EVOware Standard. In Freedom EVOware Plus, when the labware is put down at either end of the transfer rail the shuttle carrier starts to move automatically to the other end.

***Tab. 13-51** Commands for the Te-Link*

	Move - The Move command moves the shuttle carrier of the Te-Link from one end of the transfer rail to the other. See 16.41.1 “Te-Link - Move Command”, 16-128.

14 Advanced Programming Features for Scripts

This chapter describes advanced programming features for liquid handling scripts.

14.1 Variables and Expressions in Scripts

Freedom EVOware allows you to use variables in scripts instead of constants. Variables let you modify the execution of the script during runtime. You can use variables for pipetting volumes, timers and time durations, strings, names of external applications and loop counters etc. Freedom EVOware also supports expressions, which are a combination of variables and basic mathematical operators such as add or multiply. The following paragraphs discuss the definition and the use of variables.

When you run a script, the Extended View of the runtime controller shows the value of all defined variables during script runtime (see 12.1.2 “Runtime Controller, Extended View (Running a Script)”, 12-4).

Note: *To run an individual script in Freedom EVOware Plus, open the Script Editor by double-clicking the Pipette command which is associated with the script and click the Run button in the toolbar or choose Run in the Execute menu.*

14.1.1 Declaring Variables in Scripts

All variables (including pre-defined variables) must be declared (defined) before use.

Note: *The purpose of declaring a pre-defined variable is to assign an initial value (see 14.1.4 “Pre-Defined Variables”, 14-4). In offline mode, scripts may not run as expected if you do not set appropriate initial values for the pre-defined variables.*

In Freedom EVOware Plus, you can also declare variables by choosing Declare Variables in the Execute menu (see 6.4.6 “Declare Variables”, 6-12).

Variables are declared in pipetting scripts with the following command:

Tab. 14-1 *Declaring variables in a pipetting script*

Icon	Command	Description
	Set Variable	The Set Variable command is used to declare a numeric or string variable and assign an initial value to it. You can also prompt the instrument operator for the value. See 15.41 “Set Variable Command”, 15-101.

If you declare a variable within a script, the variable only has a meaningful value within the same script. It is “unknown” to other scripts (i.e. the “scope” of the variable is “script”). In Freedom EVOware Plus, you can also declare variables which are accessible to other scripts and thus allow parameters to be passed from one script to another (see 6.4.6.4 “Scope of a Variable”, 6-15).

Variable names can be 1 to 64 characters in length and must not begin with a digit. Variable names are not case-sensitive and numeric variables are treated as floating point numbers, except when used in a Send Command command (see also 14.1.7 “Script Commands That Accept Numeric Variables and Expressions”, 14-12).
The following commands can also declare variables:

Tab. 14-2 *Commands that can declare variables*

Icon	Command	Variable and value used during validation
	Balance	This command lets you write the measured weight to a variable.
	Execute Application	Return value = 0
	Send Command	Answer = “” (empty string), error code = 0

The variable name which you want to use is specified in the dialog box for the command. See also 14.1.12 “Validating a Script Which Contains Variables”, 14-18.

14.1.2 Script Commands That Write to Variables

The following table lists all commands that write to variables (see also 14.1.4 “Pre-Defined Variables”, 14-4):

Tab. 14-3 *Commands that write to variables*

Icon	Command	Description
	Aspirate	If liquid level detection is used, the LiHa pipetting commands automatically write the detected volumes to a set of predefined variables. One variable is provided for each tip. The variable names are as follows: DETECTED_VOLUME_1 ... DETECTED_VOLUME_8. The detected volume is reported in µl for each tip. The value is updated by each subsequent LiHa pipetting command which uses liquid level detection. The value -1 is reported if the tip was used with liquid level detection disabled or was not part of the pipetting command.
	Dispense	
	Mix	
	Balance	This command lets you write the measured weight to a variable. The variable name to use is specified in the command.
	Begin Loop	The Begin Loop command automatically writes to the predefined variable LOOP_x, where x is the name of the loop. Freedom EVOware sets this variable to the current cycle number for the loop, e.g. to 1 to 12 for a loop with 12 cycles.

Tab. 14-3 Commands that write to variables (cont.)

Icon	Command	Description
	Detect Liquid	The Detect Liquid command writes the detected volumes to a set of pre-defined variables DETECTED_VOLUME_x, where x is the tip number. The detected volume is reported in µl for each tip.
	Execute Application	This command lets you write the return value of the specified application to a variable. The variable name to use is specified in the command.
	Execute VB Script	The Execute VB Script command can assign values to variables for subsequent use in the Freedom EVOware script. However, you must declare the variables in advance in the Freedom EVOware script before calling the Execute VB Script command. See 15.50 “Execute VB Script Command”, 15-114.
	PosID	The PosID command automatically writes to the pre-defined counter variable TUBE_CNT, which is incremented each time a tube is successfully scanned.
	Send Command	This command lets you write the response of the specified firmware command to a variable. The returned error code can also be written to a variable. The variable name to use is specified in the command.

14.1.3 Querying the Value of a Variable During Script Runtime

The Set Variable command can be used to prompt the operator for the value of a numeric variable during script runtime (see 15.41 “Set Variable Command”, 15-101). To do this, check the *User Query* checkbox when you specify the command and specify the user prompt which should appear on the screen. You can also specify a default value and check that the value which is entered by the operator lies within a specified range.

The following example prompts the operator for a volume and sets the admissible range to 10 to 100 µl. In addition, a default value of 50 µl is suggested:

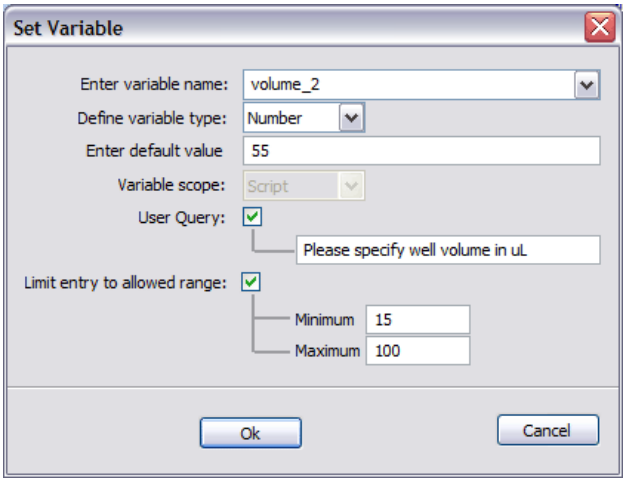


Fig. 14-1 Querying the operator for a value during script runtime

During runtime, the value which is input by the operator is validated and a warning is output if it does not lie within the specified range.

The Set Variable command can also be used to prompt the operator for the value of a string variable (text). To do this, choose *String* in the *Define variable type* pull-down list. String variables can be used to generate file names, barcodes etc.

14.1.4 Pre-Defined Variables

Freedom EVOware has a number of pre-defined variables which e.g. provide useful information for use in pipetting scripts and/or allow the same script to be used for different numbers of samples.

Note: *Even though the variable names are pre-defined, you must still declare them in your script with the Set Variable command before you can use them.*

The purpose of declaring a pre-defined variable is to assign an initial value. In offline mode, scripts may not run as expected if you do not set appropriate initial values for the pre-defined variables.

Freedom EVOware Plus

Freedom EVOware Plus processes can contain one or more pipetting scripts. in addition, Freedom EVOware Plus allows you to run several copies of the same process in parallel. Each copy of the process is called an instance. Freedom EVOware Plus also allows you to run different processes in parallel.

In Freedom EVOware Plus, the pre-defined variables have the scope “script”. In other words, the current values of the pre-defined variables are not available in other pipetting scripts. See 6.4.6.4 “Scope of a Variable”, 🗎 6-15.

If you want to access the current value of a pre-defined variable in another script from the same process or process copy, declare a new variable of scope “instance” and save the value of the pre-defined variable in the new variable using the Set Variable command:

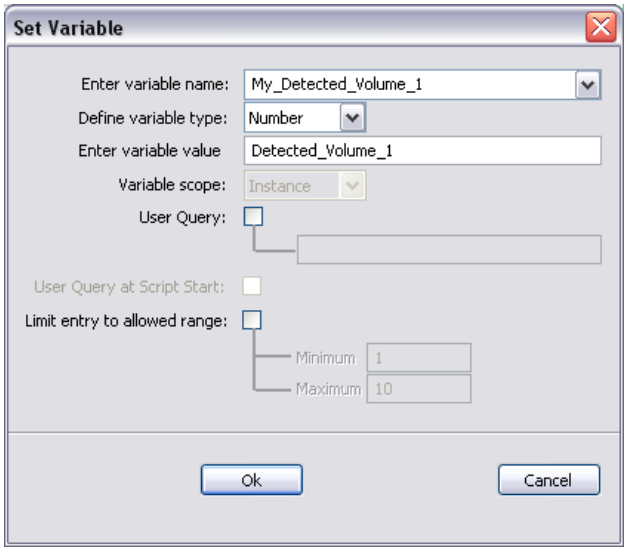


Fig. 14-2 *Set Variable command*

In the example, the variable My_Detected_Volume_1 was previously declared with scope “instance” using the Declare Variables option in the Execute menu (see 6.4.6 “Declare Variables”, 🗎 6-12).

If you want to access the current value of a pre-defined variable in a script from another process or process copy, declare a new variable of scope “run” and save the value of the pre-defined variable in the new variable using the Set Variable command.

14.1.4.1 CURRENT_USER

This read-only variable contains the name of the currently logged in user.

14.1.4.2 DETECTED_VOLUME_x

If liquid level detection is used, the LiHa pipetting commands automatically write the detected volumes to a set of variables. One variable is provided for each tip. The variable names are as follows:

DETECTED_VOLUME_1

...

DETECTED_VOLUME_8.

The detected volume is reported in µl for each tip. The value is updated by each subsequent LiHa pipetting command which uses liquid level detection. The value -1 is reported if the tip was used with liquid level detection disabled or was not part of the pipetting command.

The Detect Liquid command also writes the detected volumes to these variables.

14.1.4.3 LAST_BARCODE

This read-only variable contains the barcode which was last read by the Symbol barcode scanner.

14.1.4.4 LAST_ERROR_LINE

This read-only variable contains the line number in the pipetting script of the last command which reported an error during script runtime.

14.1.4.5 LAST_ERROR_MESSAGE

This read-only variable contains the error message of the last command which reported an error during script runtime (see 18.3 “List of Error Messages”, 🗎 18-32).

14.1.4.6 LAST_ERROR_MESSAGE_ID

This read-only variable contains the error message ID of the last command which reported an error during script runtime. The error message ID which is returned by this variable is a numeric value which is calculated as follows from the error message ID string (see 18.3 “List of Error Messages”, 🗎 18-32):

- Ignore all characters except the last seven
- Ignore underscore character
- Ignore the leading zero (if any)

Example:

- Error message ID string: EVO_EVO_016_024
- Error message ID: 16024

14.1.4.7 LIHA_MOVE_HEIGHT

This variable lets you specify the Z-Travel height for the Move LiHa command (the tip height which is used during the arm movement). The Z-Travel height you

specify with this variable only applies to the tips you select in the Move LiHa command. The Z-Position of the unselected tips remains unchanged.

This variable only takes effect if you choose *Positioning with variable Z-Travel* in the Move LiHa command.

A positive value for LIHA_MOVE_HEIGHT means that the tips will be lower during the arm movement. A value of 0 is the highest position (tips fully retracted during the arm movement).

An example application of this feature is for pipetting instruments which have vacuum lines to the tips for the removal of liquids.

14.1.4.8 LOOP_x

The Begin Loop command automatically writes to the variable LOOP_x, where x is the name of the loop. Freedom EVOware sets this variable to the current cycle number for the loop, e.g. to 1 to 12 for a loop with 12 cycles.

14.1.4.9 MCA_MOVE_HEIGHT

This variable lets you specify the Z-Travel height for the MCA96 Move command (the tip height which is used during the arm movement). The Z-Travel height you specify with this variable only applies to the tips you select in the MCA96 Move command. The Z-Position of the unselected tips remains unchanged.

This variable only takes effect if you choose *Positioning with variable Z-Travel* in the MCA96 Move command.

A positive value for MCA_MOVE_HEIGHT means that the tips will be lower during the arm movement. A value of 0 is the highest position (tips fully retracted during the arm movement).

An example application of this feature is for pipetting instruments which have vacuum lines to the tips for the removal of liquids.

14.1.4.10 PROCESS_ITERATION

To achieve the maximum throughput (efficiency) of the pipetting instrument, for example the maximum number of processed microplates per hour, Freedom EVOware Plus allows you to run several copies (instances) of the same process in parallel. The number of process copies you want to run is chosen in the Runtime Controller when you run the process.

This read-only variable contains the number of the process which is running the current pipetting script. You can use it e.g. to pipette to a different well column depending on the process copy. Process copies are counted starting with 1. The process number is also shown in the log files. This variable is not relevant for Freedom EVOware Standard.

14.1.4.11 PROCESS_NAME

This read-only variable contains the name of the process which is running the current pipetting script (as shown in the title bar of the Process Editor). You can use it e.g. in the User Prompt command. This variable is not relevant for Freedom EVOware Standard.

14.1.4.12 PROCESS_NODE

This read-only variable contains the name of the process step which is running the current pipetting script (as shown in the process icon in the Process Editor). You can use it e.g. in the User Prompt command. This variable is not relevant for Freedom EVOware Standard.

14.1.4.13 RACK_OFFSET

This variable lets you modify the labware selection for the basic commands Aspirate, Dispense, Mix and Move LIHA. If e.g. RACK_OFFSET equals 1, Freedom EVOware searches for the next labware of the same type on the worktable. The search direction is from rear to front of the worktable and then from left to right. Negative values in RACK_OFFSET cause Freedom EVOware to search in the opposite direction.

Set RACK_OFFSET to 0 to deactivate the offset.

14.1.4.14 RACK_VOLUME_x

The Te-MO, the MCA96 and the MCA384 do not support liquid level detection. If you want to use a liquid class for these pipetting arms which specifies liquid level detection, the liquid level must be emulated. To do this, specify the well volume (well capacity) of the labware you are using by assigning a value to this variable. Replace the X in the variable name with the labware label (labware name), e.g. use RACK_VOLUME_SOURCE if you named the labware SOURCE. For mechanical reasons, the same volume is pipetted by all of the tips.

Instead of setting this parameter to the well volume (well capacity), you can use the LiHa command Detect Liquid before you aspirate with the Te-MO, MCA96 or MCA384 to detect the actual liquid level in one of the wells. Then copy the value reported in the DETECTED_VOLUME_x variable to the RACK_VOLUME_x variable (see 14.1.4.2 “DETECTED_VOLUME_x”, 14-5).

Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. The Te-MO and MCA96 only use the emulated liquid level detection for aspiration. The MCA384 uses it for dispensing, too. The value of the RACK_VOLUME_x varable is not updated by subsequent pipetting commands, even if they affect the volume of liquid in the wells.

14.1.4.15 REPLACE_DITI_GRID

If you are using DITIs, Freedom EVOware provides special facilities to ensure that sufficient DITIs are present on the worktable for your script or process and to automatically fetch new DITI racks as and when needed.

For each Get DITI command in your pipetting script, Freedom EVOware automatically sets the two variables REPLACE_DITI_GRID and REPLACE_DITI_SITE to the correct grid and site for the selected DITI type before executing the command.

If your script includes an Activate DITI Handling command and all of the DITIs in the rack have been used, Freedom EVOware calls the DITI replacement script which is specified in the command. The replacement script is normally implemented using one or more Transfer Labware commands

The worktable location of the DITI rack which needs replacing is specified in the replacement script with the variables REPLACE_DITI_GRID and REPLACE_DITI_SITE.

These two variables are only used by the automatic DITI handling feature in Freedom EVOware Standard. Freedom EVOware Plus uses a different concept for automatic DITI handling.

See 17.1 “Using the Automatic DITI Handling feature”, 17-1) for more information.

14.1.4.16 REPLACE_DITI_SITE

If you are using DITIs, Freedom EVOware provides special facilities to ensure that sufficient DITIs are present on the worktable for your script or process and to automatically fetch new DITI racks as and when needed.

For each Get DITI command in your pipetting script, Freedom EVOware automatically sets the two variables REPLACE_DITI_GRID and REPLACE_DITI_SITE to the correct grid and site for the selected DITI type before executing the command.

If your script includes an Activate DITI Handling command and all of the DITIs in the rack have been used, Freedom EVOware calls the DITI replacement script which is specified in the command. The replacement script is normally implemented using one or more Transfer Labware commands

The worktable location of the DITI rack which needs replacing is specified in the replacement script with the variables REPLACE_DITI_GRID and REPLACE_DITI_SITE.

These two variables are only used by the automatic DITI handling feature in Freedom EVOware Standard. Freedom EVOware Plus uses a different concept for automatic DITI handling.

See 17.1 “Using the Automatic DITI Handling feature”, 17-1) for more information.

14.1.4.17 SAMPLE_CNT

If you want to write a script which allows a different number of samples in each run, you would normally need to modify the script each time you use it. The SAMPLE_CNT counter variable allows you to write a script for the maximum number of samples which you expect and to limit the script during runtime according to the actual number of samples. SAMPLE_CNT is intended for use in loops in combination with basic pipetting commands such as Aspirate, Dispense, Mix, Get DITIs and Drop DITIs.

This feature is activated by assigning a positive value to SAMPLE_CNT.

If SAMPLE_CNT is set to a value which is greater than or equal to 0, Freedom EVOware keeps a count of how many different tips are used in each cycle of the following loop(s). The loop is then terminated the next time **End Loop** is executed when the number of tips used reaches SAMPLE_CNT. If SAMPLE_CNT is not a multiple of the number of tips used in one cycle of the loop(s), Freedom EVOware modifies the tip selection in the final cycle of the loop.

The following figure shows an example of using the SAMPLE_CNT variable:

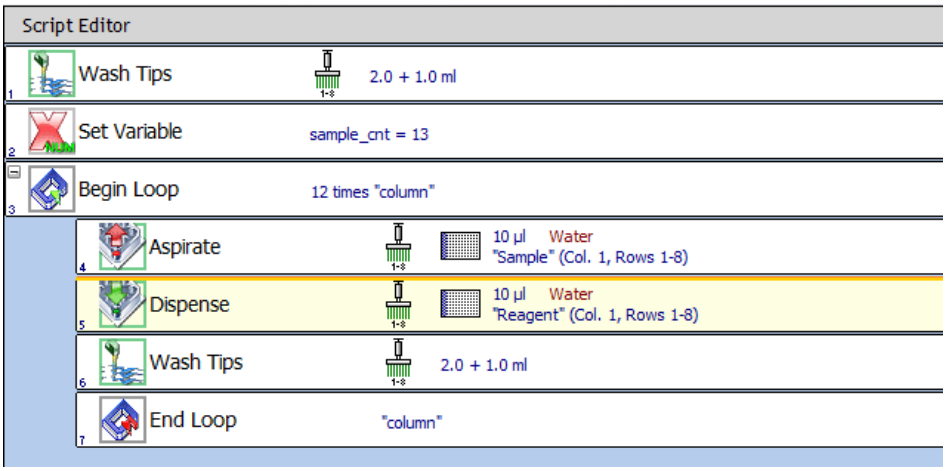

Script Editor
1 Wash Tips 2.0 + 1.0 ml
2 Set Variable sample_cnt = 13
3 Begin Loop 12 times "column"
4 Aspirate 10 µl Water "Sample" (Col. 1, Rows 1-8)
5 Dispense 10 µl Water "Reagent" (Col. 1, Rows 1-8)
6 Wash Tips 2.0 + 1.0 ml
7 End Loop "column"

Fig. 14-3 *Using the SAMPLE_CNT variable*

The above example script copies 10 µl from the source labware to the destination labware. The loop is programmed for a maximum of 96 samples or wells. If SAMPLE_CNT is set to 13, the script is executed as follows:

- Wash tips 1-8,
- Aspirate with tips 1-8 from column 1 of the source labware,
- Dispense with tips 1-8 into column 1 of the destination labware,
- Wash tips 1-8,
- Aspirate with tips 1-5 from column 1 of the source labware,
- Dispense with tips 1-5 into column 1 of the destination labware,
- Wash tips 1-8.

Set SAMPLE_CNT to -1 to deactivate this feature again.

You can prompt the operator for the value of SAMPLE_CNT during script runtime with the Set Variable command (see 15.41 “Set Variable Command”, 15-101).

14.1.4.18 TIP_MASK

This variable lets you modify the tip selection for the pipetting commands Aspirate, Dispense, Mix, Wash Tips, Periodic Wash, Get DiTis, Drop DiTis, Pick Up DiTis, Set DiTis Back, Detect Liquid, Activate/Deactivate PMP, and Move LiHa. The tip selection is specified as a numeric, bit-coded value (tip1 = 1, tip2 = 2, tip3 = 4, tip4 = 8, tip5 = 16, tip6 = 32, tip7 = 64, tip8 = 128). The tip selection assigned with this variable masks the tip selection specified in the pipetting command (bit-wise AND of the tip selection in the pipetting command and the current TIP_MASK value). Thus, only tips selected in both masks will be used for pipetting.

Set TIP_MASK to -1 to deactivate the mask. Freedom EVOware then uses the tip mask which is specified in the pipetting command.

14.1.4.19 TIP_OFFSET

This variable lets you modify the tip selection for the pipetting commands Aspirate, Dispense, Mix and Move LIHA. A positive value increments the tip number(s) which are specified in the pipetting command. For example, if the pipetting command specifies tips 2 and 3 and you set this variable to 1, tips 3 and 4 will be used instead. Negative values of TIP_OFFSET shift the tip selection in the opposite direction.

Set TIP_OFFSET to 0 to deactivate the offset. Freedom EVOware then uses the tip selection which is specified in the pipetting command.

14.1.4.20 TIP_VOLUME_x

Liquid level detection can be used e.g. to ensure minimal tip contamination by limiting the tip immersion depth. Liquid level detection is activated with the Aspirate and/or Dispense parameters of the liquid class you are using.

This variable, which only applies to pipetting with the LiHa, can be used to bypass or override the automatic liquid level detection for special applications. For example, you can write a script for pipetting with a variable tip immersion depth.

To bypass automatic liquid level detection, specify the volume of liquid in one of the wells by assigning a non-zero value to this variable. Replace the X in the variable name with the tip number, e.g. use TIP_VOLUME_2 for tip 2. The setting you make only applies to the next pipetting operation (aspirate, dispense or mix) and is reset to zero again after this. If necessary, you can specify a value for this variable several times in your script. Tip: You can use the Detect Liquid command before you pipette to detect the actual liquid level in the wells (see 14.1.4.2 “DETECTED_VOLUME_x”, 14-5).

14.1.4.21 TUBE_CNT

After executing a PosID command, Freedom EVOware writes the number of tubes scanned in the script so far to TUBE_CNT.

14.1.4.22 WELL_OFFSET

This variable lets you modify the well selection for the pipetting commands Aspirate, Dispense, Mix and Move LIHA. Freedom EVOware shifts the well selection in the labware by the number of wells defined in WELL_OFFSET. If e.g. A1 to H1 of a microplate have been selected in the script and WELL_OFFSET is set to 8, Freedom EVOware will pipette in A2 to H2. When applying the offset, Freedom EVOware shifts from rear to front and then from left to right. Negative values of WELL_OFFSET shift the well selection in the opposite direction.

Set WELL_OFFSET to 0 to deactivate the offset. Freedom EVOware then uses the well selection which is specified in the pipetting command.

14.1.5 Script Commands That Accept String Variables

The following table lists all commands that accept string variables:

Tab. 14-4 *Commands that accept string variables*

Icon	Command	Parameter name(s)
	Balance	**Store weight in variable**
	Condition	**If** variable
	Execute Application	**Path** & **Name** & **Command line**
	Execute VB Script	**Path & Name**
	Notification	**Receiver Group**, **Subject** and **Message**
	Send Command	**Command**
	Set Variable	**Value**
	Start Script	**Script.gem**

Tab. 14-4 Commands that accept string variables (cont.)

Icon	Command	Parameter name(s)
	Sub-Routine	**Path & Name**
	User Prompt	**Text**
	Worklist	**Worklist (Path and Name)**
	Worklist Import	**Import Worklist** and **Generated Freedom EVOware Worklist**

14.1.6 Mathematical Expressions

In addition to using variables and constants, certain script commands also allow you to specify a mathematical expression (see 14.1.7 “Script Commands That Accept Numeric Variables and Expressions”, 14-12).

An expression is constructed from floating point numbers, variables and operators. The following operators are available:

Tab. 14-5 Expressions that can be used with variables

Operator	Function
+	addition
-	subtraction
*	multiplication
/	division
%	modulo division (division remainder)
( )	parenthesis, used to specify the evaluation order

Examples of valid expressions:

volume

volume + 10.5

*volume * 2*

*volume + (samples * 2)*

*3 + 4 * 5*

Spaces in expressions are ignored. Multiplication and division have precedence over addition and subtraction.

Modulo division returns the remainder of a division as an integer.

Examples: 13 % 8 = 5, 49 % 8 = 1

If e.g. the number of samples in a pipetting operation is not an exact multiple of the number of tips you are using, modulo division can be used to calculate how many samples you need to pipette in the last cycle of a pipetting loop. Take care when using modulo division if one or both of the arguments are negative values.

We recommend you to write a small test script to learn how modulo division works in this case.
Numeric variables and expressions can also be converted to strings (see 14.1.8 “Converting Numeric Variables and Expressions to Strings”, 14-13).

14.1.7 Script Commands That Accept Numeric Variables and Expressions

Some commands accept numeric variables and expressions instead of integers or floating point values, for example:

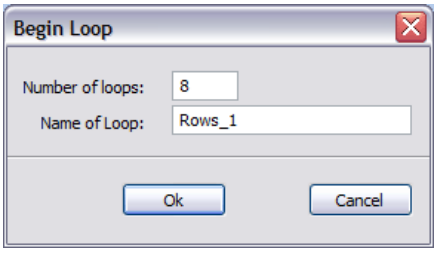


Fig. 14-4 *Using an expression in a command*

The following table lists all commands that accept numeric variables and expressions.

Tab. 14-6 *Commands that accept numeric variables and expressions*

Icon	Command	Parameter name(s)
	Aspirate	**Volume** or **Individual Volumes**
	Begin Loop	**Number of loops**
	Condition	Both sides of the comparison operator
	Dispense	**Volume** or **Individual Volumes**
	Import Variable	Line number in **Read specified line** Column number in **Start in specified column**
	Mix	**Volume** or **Individual Volumes**
	Periodic Wash	**Period**
	PnP Vector	**Grid**, **Site** and **Position in labware**
	RoMa Vector	**Grid** and **Site**
	Set DITI Position	**Grid**, **Site** and **Position in labware**

Tab. 14-6 Commands that accept numeric variables and expressions (cont.)

Icon	Command	Parameter name(s)
	Set Variable	**Value**
	Start Timer	**Timer**
	Te-MO Relative Movements	**Offset**
	Te-MO Aspirate	**Volume**
	Te-MO Dispense	**Volume**
	Te-MO Mix	**Volume**
	Tip Alignment Check	**Sensorplate position, Script aborts if...** and **Correct pipetting position if...**
	Wait for Timer	**Timer** and **Time span**
	Wash Tips	**Volume in Waste** and **Volume in Cleaner**

Some of the above parameters (e.g. *Timer*, *Grid* and *Site*) expect integer values. Floating point values are also accepted and do not cause an error, but they will be rounded before being used. In such cases, it is recommended to use integer calculations to avoid unexpected results.

14.1.8 Converting Numeric Variables and Expressions to Strings

Some script commands (e.g. User Prompt) allow you to specify a numeric or string variable or a mathematical expression instead of a string, e.g. for displaying the value of the variable during runtime (see 14.1.10 “Script Commands That Accept Variables and Expressions Converted to a String”, 14-16).

The expression or variable is enclosed within tilde characters “~”. Freedom EVOware then replaces the expression with the value of the expression during runtime.

The following shows an example script and the user prompt during script runtime:

***Fig. 14-5** Freedom EVOware script with user prompt*

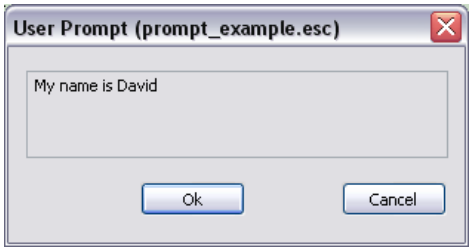


Fig. 14-6 *User Prompt during script runtime*

See 15.41 “Set Variable Command”, 15-101.
This example has a mathematical expression in the User Prompt command:

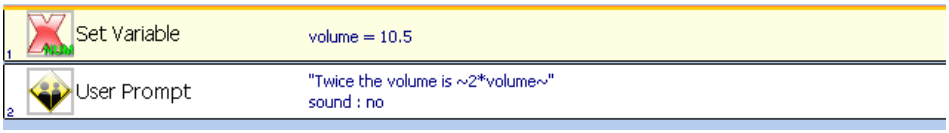


Fig. 14-7 *Freedom EVOware script with user prompt*

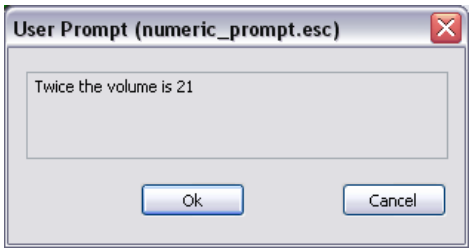


Fig. 14-8 *User prompt during script runtime*

The next example passes a variable to an external application as a command line parameter:

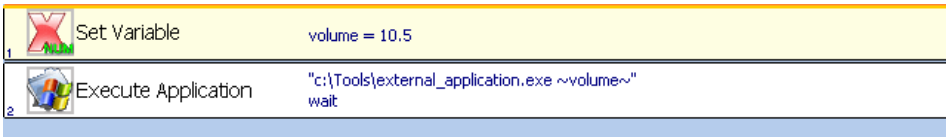


Fig. 14-9 *Passing a variable to an external application*

The following example shows how to use string variables and numerical variables to generate a worklist file name:

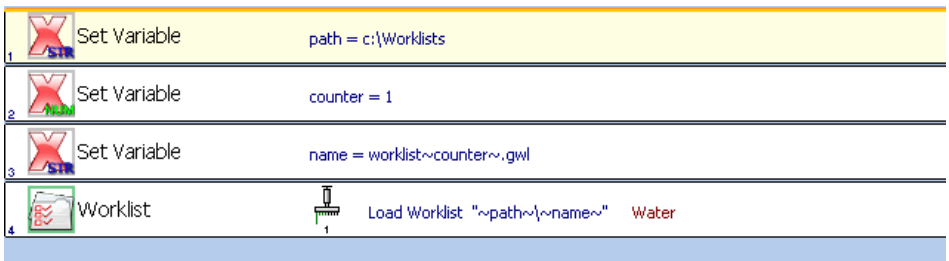


Fig. 14-10 *Using string variables to generate worklist file names*

In line 3, the numeric variable counter is converted to a string by enclosing it within tilde characters “~”. The string variable name is then assigned the value “worklist1”.
In line 4, the Worklist command expects a string variable. The string variables path and name must be enclosed within tilde characters, since otherwise they would be interpreted literally.

14.1.9 Array Variables

An array of variables can be declared with the Set Variable command by appending a counter variable to the variable name and enclosing the counter variable within brackets [] and tilde characters “~”. Freedom EVOware then replaces the counter variable name with the value of the counter during runtime.
In the following example script, which creates an array of 8 variables TipVolume[1], TipVolume[2] etc., tilde characters “~” have been used in the user prompt, too:

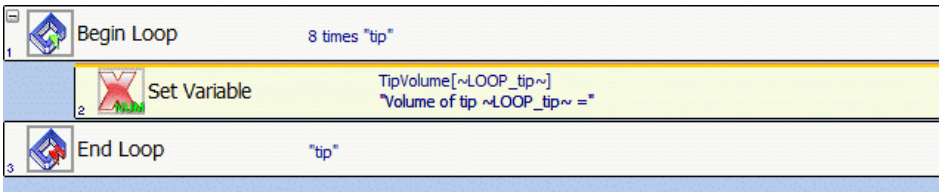


Fig. 14-11 *Array of variables*

The parameters of the Set Variable command are as follows:

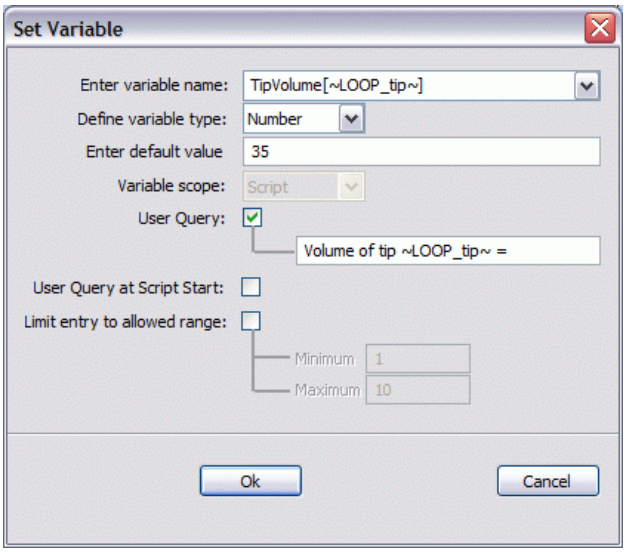


Fig. 14-12 *Array of variables - Set Variable command*

The user prompt at runtime is as follows:

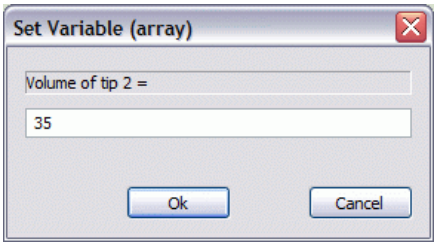


Fig. 14-13 *Array of variables - User prompt during script runtime*

14.1.10 Script Commands That Accept Variables and Expressions Converted to a String

The following table lists the commands that accept variables and expressions converted to a string (i.e. plain text):

Tab. 14-7 *Commands that accept variables and expressions converted to a string*

Icon	Command	Parameter name(s)
	Execute Application	**Path** & **Name** & **Command line**
	Send Command	**Command** (the expression is converted to an integer value before converting it to a string)
	Set Variable	**Query** (**Value** and **Default** are also accepted if you declare a string variable)
	User Prompt	**Text**

14.1.11 Labware Attributes and String Variables

The Set Variable command allows you to read from and write to the labware attribute “ID” from within pipetting scripts during script runtime. Freedom EVOware uses the attribute “ID” to store the labware barcode. You can use this feature to access scanned barcodes from within pipetting scripts.

You cannot read from or write to carrier attributes or other labware attributes in this way.

This feature is available for both Freedom EVOware Standard and Freedom EVOware Plus and is mainly intended for advanced applications. Take care when modifying labware attributes.

In Freedom EVOware Plus, labware attributes are automatically assigned to string variables, so it is not necessary to use the Set Variable command in this case (see 14.1.11.1 “Labware Attributes and String Variables in Freedom EVOware Plus”, 14-18).

Each of the attributes is associated with a script variable using the following syntax:

$<labware_label>[index].<internal name of attribute>$

[index] is the well number (for microplates) or tube number (for tube racks).

If you omit [index], then the string returns the labware or tube rack barcode instead of the well or tube barcode.

For example:

$MyTubeRack2[5].ID$ - barcode of tube 5 in tube rack “MyTubeRack2”

$MyTubeRack1.ID$ - barcode for the tube rack “MyTubeRack1”

See 11.7.1 “Assigning a Label (Name) to the Labware”, 11-19.

An alternative syntax is as follows:

$<carrier_type>[site_global][index].<internal name of attribute>$

[site_global] is the site number counted for all sites for this labware type on the worktable, counted from rear to front and then from left to right. It is not the same as the site number on the carrier. For example, if there are two 3-position MP carriers on the worktable at grid position 10 and 20, [site_global] = 4 for this carrier type refers to site 1 of the carrier at grid position 20.

[index] is the well number (for microplates) or tube number (for tube racks).

If you omit [index], then the string returns the labware or tube rack barcode instead of the well or tube barcode. You must not omit [site_global].

For example:

$Tube 16 mm 16 Pos[2][3].ID$ - barcode of tube 3, second tube rack on the worktable (tube racks only have one site)

$MP 3Pos[4].ID$ - barcode of the labware at site 1 of the second MP carrier on the worktable

$MP 3Pos[3][18].ID$ - barcode of well 18 on the labware at site 3 of the first MP carrier on the worktable

Microplate wells do not normally have barcode labels. Nonetheless, the internal database of Freedom EVOware provides a barcode attribute field for microplate wells, too. This can be used for special applications, e.g. sample tracking.

Script example

The following example assumes that there is only one MP carrier on the worktable.

The label of the labware on site 1 is Labware4.

The label of the labware on site 2 is Labware5.

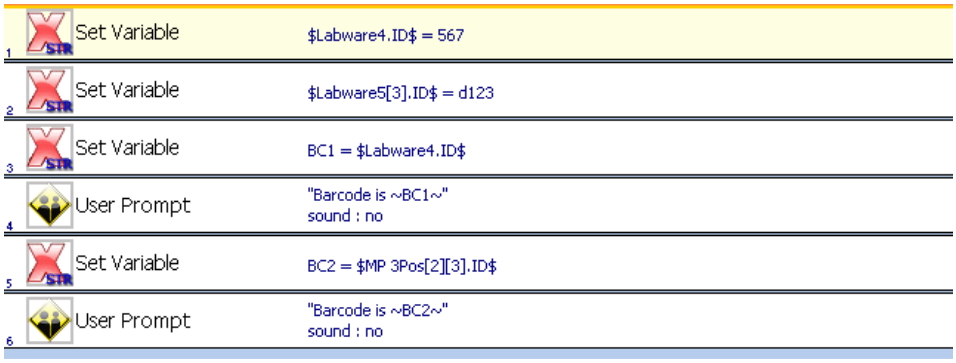

1 Set Variable $Labware4.ID$ = 567
2 Set Variable $Labware5[3].ID$ = d123
3 Set Variable BC1 = $Labware4.ID$
4 User Prompt "Barcode is ~BC1~" sound : no
5 Set Variable BC2 = $MP 3Pos[2][3].ID$
6 User Prompt "Barcode is ~BC2~" sound : no

Fig. 14-14 *Example script*

Line 1 sets the labware barcode of site 1 to “567”.

Line 2 sets the well barcode of site 2, well 3 to “d123”.

Line 3 copies the labware barcode of site 1 to string variable BC1.

Line 4 displays the string BC1 (= “567”) on the screen.

Line 5 copies the well barcode of site 2, well 3 to string variable BC2.
Line 6 displays the string BC2 (= “d123”) on the screen.

Note: *Normally, the barcode attribute is set by a barcode scanning operation such as the PosID command, and not by assigning a value as in script line 1. The above script solely serves to demonstrate the features which are available.*

14.1.11.1 Labware Attributes and String Variables in Freedom EVOware Plus

Freedom EVOware Plus allows you to read from and write to labware attributes from within pipetting scripts during script runtime. You cannot read from or write to carrier attributes in this way.
Each of the attributes is automatically associated with a script variable using the following syntax:
<labware_label>.<internal name of attribute>
For example:
MyPlate1.Grip_Narrow
MyPlate2.ID
You can use this feature e.g. to access scanned barcodes from within pipetting scripts. This feature is mainly intended for advanced applications. Take care when modfying labware attributes. See also 11.7.1 “Assigning a Label (Name) to the Labware”, 11-19.
The Attributes dialog box for the Edit Labware dialog box normally shows descriptive names for the attributes. Check the *Show internal names* checkbox to see the internal names which are used.

14.1.12 Validating a Script Which Contains Variables

Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors and shows all commands which have errors in red. When validating the script, Freedom EVOware uses default values for variables which are set during run-time, e.g. from operator prompts or return codes.
The following table lists the default values which are used during validation for commands which can declare variables:

Tab. 14-8 *Commands with default values for variables for use during script validation*

Icon	Command	Variable and value used during validation
	Balance	Store weight in variable = 0
	Execute Application	Return value = 0
	Send Command	Response = “” (empty string), Error code = 0
	Set Variable	Variable = specified default value or default string

Choose Auto-Validation in the Edit menu if you want to switch off automatic validation of pipetting scripts (see 6.2.5 “Auto-Validation”, 6-9). You then need to validate the script manually (by choosing Validate Script in the Edit menu).

If your script contains conditional jumps or branches, validation only checks those parts of the script which are executed with the default values of the IF variables in Condition commands. For this reason, it is not recommended to declare variables (e.g. with the Set Variable command) within conditional parts of the script.

14.2 Conditions

See 15.44 “Condition Command”, 15-109.

14.3 Sub-routines

Sub-routines are Freedom EVOware scripts (*.esc files) which can be used as parts of another script. They allow you to structure and shorten complex scripts and to build libraries of pipetting procedures (e.g. serial dilutions) which you want to use repeatedly.

The differences between separate scripts and sub-routines are:

- sub-routines use the same worktable as the main script.
- sub-routines can share variables and timers with the main script.
- sub-routines can execute a worklist which is loaded by the main script.

Loop names and line markers for conditions are not shared between sub-routines and the main script.

14.3.1 Creating a Sub-Routine

To create a sub-routine, simply write a Freedom EVOware script and then store it. You must use the same worktable layout as in the main script.

14.3.2 Sub-Routine Command

The Sub-Routine command executes another script as part of the current script.

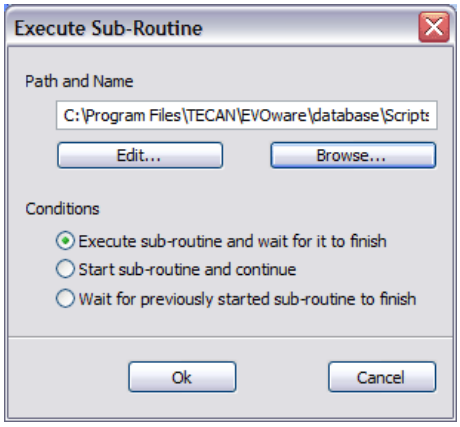


Fig. 14-15 *Sub-Routine command*

The parameters of the Sub-Routine command are as follows:

Path & Name

This edit field shows the filename and location of the Freedom EVOware script you want to use as a sub-routine.

Edit: Click this button if you want to open the specified sub-routine in a new window for editing and/or checking.

Browse: Click this button to look for existing Freedom EVOware scripts and to choose the one you want to use as a sub-routine.

Execute sub-routine and wait for it to finish

This option causes the main Freedom EVOware script to wait for the sub-routine to finish before continuing.

Start sub-routine and continue

With this option, the main pipetting script continues without waiting for the sub-routine to finish (“asynchronous” sub-routine, i.e. asynchronous processing of the main script and the sub-routine). To allow asynchronous processing, the sub-routine must only contain the following commands:

- LiHa Commands
  - Aspirate
  - Dispense
  - Mix
  - Wash Tips
  - Periodic Wash
  - Activate DITI Handling
  - Get DITIs
  - Drop DITIs
  - Set DITI Position
  - Pick Up DITIs
  - Set DITIs Back
  - Pickup ZipTip
  - Detect Liquid
  - Tip Alignment Check
  - Move LiHa
  - Waste
  - Active WashStation

  - Worklist
  - Export Data
  - Manual Tip Alignment
- Programming Commands
  - Start Timer
  - Wait for Timer
  - Execute Application
  - Comment
  - User Prompt
  - BeginLoop
  - EndLoop
  - Set Variable
  - ImportVariable
  - ExportVariable
  - Condition
  - If-Then
  - Else
  - End-If
  - Group or Wizard
  - GroupEnd or WizardEnd
  - Sub-routine
  - Execute VB Script
  - On Error Go To
  - Resume
  - End Script
  - Send Command
- Commands for the Plate and Tube Robot
  - Move ROMA
  - ROMA Vector
  - Transfer Labware
  - Move PnP
  - PnP Vector
  - Transfer Tube
- MCA96 Commands
  - Aspirate
  - Dispense
  - Mix
  - Wash
  - Get DITIs
  - Drop DITIs
  - Get Tip Block
  - Drop Tip Block
  - Move
  - Vector
  - Relative Movements
  - Transfer Labware
- MCA384 Commands
  - Aspirate
  - Dispense

  - Mix
  - Wash
  - Get Head Adapter
  - Drop Head Adapter
  - Get DITIs
  - Drop DITIs
  - Get Tip Block
  - Drop Tip Block
  - Move
  - Transfer Labware
  - Vector
  - Dock CGM
  - Undock CGM
- Te-MO Commands
  - Aspirate
  - Dispense
  - Mix
  - Wash
  - Wash 384 Tip Head
  - Get DITIs
  - Drop DITIs
  - Get Tip Block
  - Drop Tip Block
  - Refill Trough
  - Relative Movements
  - Load the Te-MO
  - Fill System (384 tip head)
- All device commands (see 13.2 “Overview of Device Commands”, 13-12)

Wait for previously started sub-routine to finish

This option causes the main Freedom EVOware script to wait for the specified, previously started sub-routine to finish before continuing.

Note: *You can also start a sub-routine from within another sub-routine by including a Sub-Routine command within the sub-routine.*

14.3.3 Exchanging Data With Sub-Routines

Variables are shared between the main script and the sub-routine and can be used to exchange data. To feed in data into the sub-routine, set a variable in the main script and use the same variable in the sub-routine (e.g. for volumes or loops). To get data back from a sub-routine (e.g. error codes), write the data to a variable in the sub-routine and use the same variable in the main script.

14.3.4 Validating a Script Which Contains Sub-Routines

Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors and shows all commands which have errors in red. If a problem is detected in a sub-routine,

Freedom EVOware shows the Sub-Routine command in the main script in red. To correct the error, you have to open and correct the sub-routine script manually.

14.3.5 Log file for a Script Which Contains Sub-Routines

Freedom EVOware reports the currently executed script line in the log window and in the log file. A typical line in the log file is as follows:

```
E 11:55:42 Line  1 : Aspirate
```

When Freedom EVOware executes a sub-routine, it displays the line number in the main script and the line number in the sub-routine, separated by a slash /. A typical line then looks like this (line 2 of the main script, line 1 of the sub-routine, Aspirate command):

```
E 11:55:42 Line 2/1 : Aspirate
```

If you are using sub-routines nested inside of other sub-routines, the log file shows the line numbers of all levels, separated by slashes.

14.4 Loop Options

Many of the standard pipetting commands allow you to specify loop options, which let you use a different column, row, well and/or labware for each loop cycle if you are using the command in a script loop.

In the dialog box for the command, click Loop Options to view, define or modify the loop options:

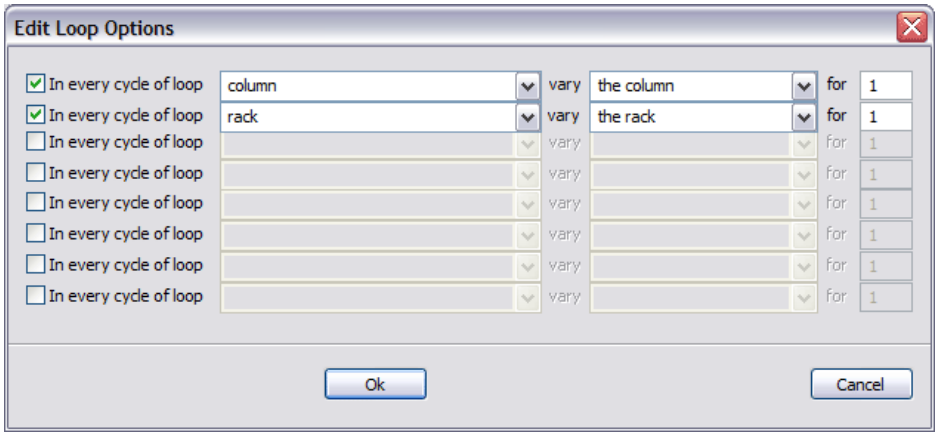


Fig. 14-16 *Loop Options dialog box*

The fields of the Loop Options dialog box are as follows:

In every cycle of loop ...

Choose the name of the loop to which the loop options refer. The popup list only shows the loops which are relevant for the script line where you have inserted the pipetting command. Note: Loop names are defined in your script with the Begin Loop command.

Vary, for

Specify how to modify the current well selection in each cycle of the loop. Choose column, row, well or labware from the *vary* popup list and specify the increment in the *for* field. A positive value in the *for* field increases the chosen parameter (e.g. use the next column) and a negative value decreases it. Freedom EVOware interprets a positive value in the *for* field as follows:

Column	Left to right
Row	Rear to front
Well	Rear to front, then left to right
Labware	Rear to front on same carrier, then the next carrier to the right

For standard 96-well microplates with 8 wells per column, “In every cycle of loop ’loop1’, vary the well for +8” has the same effect as “In every cycle of loop ’loop1’, vary the column for +1”.

Add option

Click this button to add the current loop settings to the list of defined loop options.

Defined loop options

This shows you all of the currently defined loop options for the pipetting command.

Delete option

Click this button to delete the currently selected loop option from the list.

15 Script Commands

This chapter contains detailed descriptions of the Freedom EVOware script commands.

In Freedom EVOware Plus, when the Script Editor is open the Commands tab of the Control Bar only shows script commands (commands which are used for writing pipetting scripts, see 13.1 “Overview of Script Commands”, 13-1). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices, see 13.2 “Overview of Device Commands”, 13-12).

In Freedom EVOware Standard, the Control Bar always shows both command types (it does not have a Process Editor).

15.1 Aspirate Command

The Aspirate command is used to pick up liquid from specified positions on the worktable.

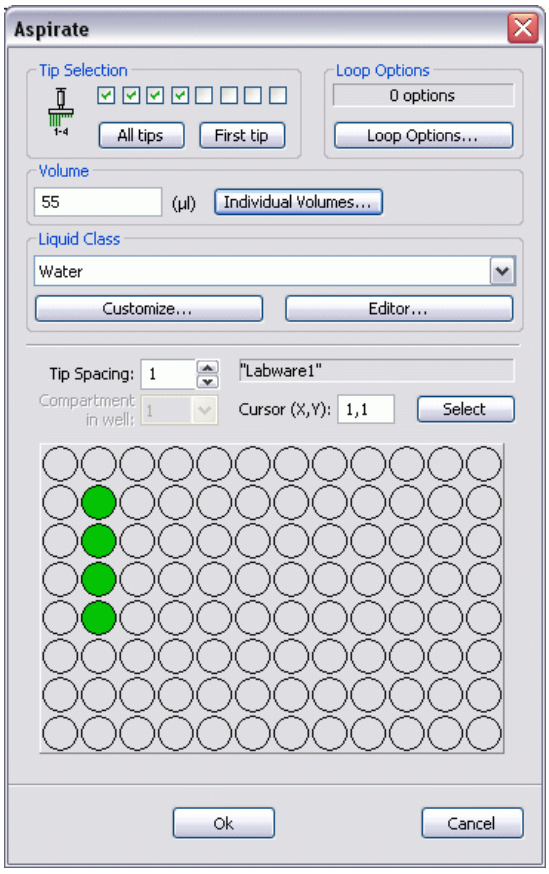


Fig. 15-1 *Aspirate command*

The parameters of the Aspirate command are as follows:

Tip Selection

Select the tips you want to use.

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. You can choose different loop options for the source and the destination. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Liquid Classes

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

Volume

Specify the volume that you want to aspirate. Click *Individual Volumes* if you want to select a different volume for each tip. The maximum allowed volume is the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity).

Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Select the labware for the source by clicking on the labware in the Worktable Editor. Then click on the required source well(s). The gray (protected) field then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

Select: Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landcape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

15.2 Dispense Command

The Dispense command is used to dispense liquid to specified positions on the worktable.

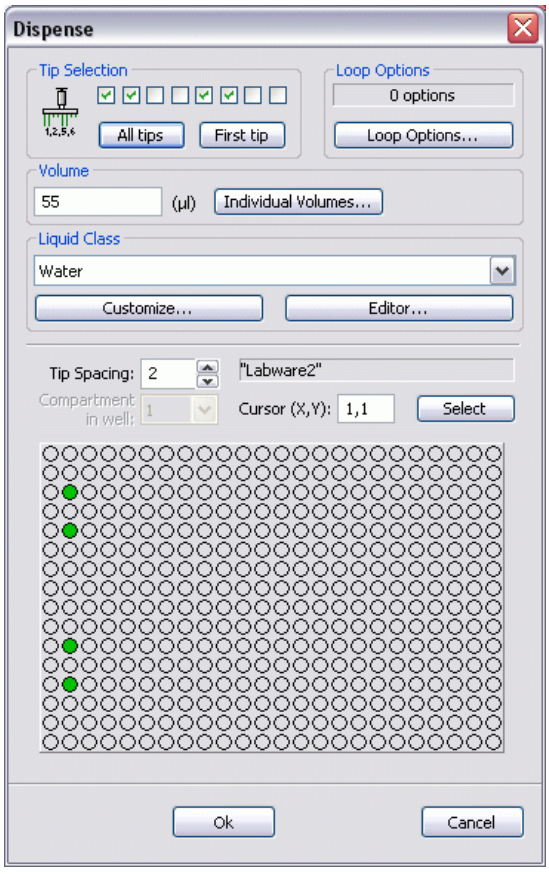


Fig. 15-2 *Dispense command*

The parameters of the Dispense command are as follows:

Tip Selection

Select the tips you want to use.

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. You can choose different loop options for the source and the destination. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Liquid Classes

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

Volume

Specify the volume that you want to dispense. Click *Individual Volumes* if you want to select a different volume for each tip. The maximum allowed volume is the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity).

Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Select the labware for the destination by clicking on the labware in the Worktable Editor. Then click on the required destination well(s). The gray (protected) field then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

Select: Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landcape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

15.3 Mix Command

The Mix command performs a mix operation by aspirating and then dispensing at the same position.

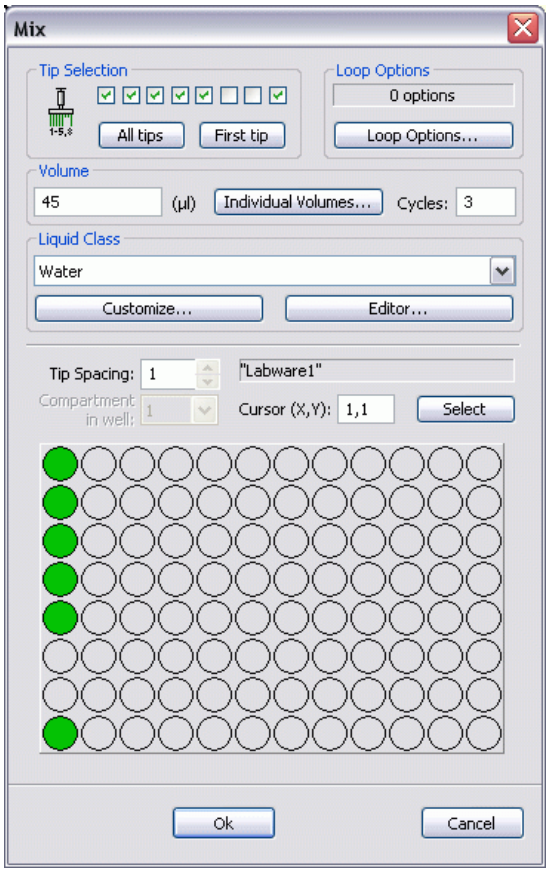


Fig. 15-3 *Mix command*

The parameters of the Mix command are as follows:

Tip Selection

Select the tips you want to use.

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. You can choose different loop options for the source and the destination. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Liquid Classes

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Aspirate or Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

Volume

Specify the volume that you want to aspirate for the mixing process. Click *Individual Volumes* if you want to select a different volume for each tip. The maximum allowed volume is the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity).

Cycles

Specify how often you want to repeat the mixing process.

Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly

adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Select the labware for the source and destination by clicking on the labware in the Worktable Editor. Then click on the required well(s). The gray (protected) field then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

Select: Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landcape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

15.4 Wash Tips Command

The Wash Tips command is used to flush and wash fixed tips or to flush DITI adapters using a wash station. It is not intended for flushing DITI tips (DITI tips should not normally be flushed). If you are using DITIs, make sure in your script that there are none attached when this command is executed.

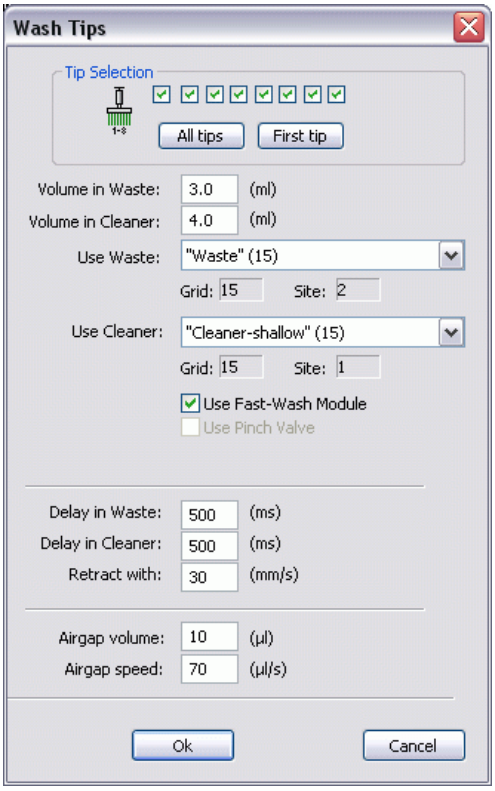


Fig. 15-4 *Wash Tips command*

Tips should be washed as often as necessary, e.g. after a pipetting sequence and before taking a new sample. DITI adapters should be flushed after replacing the DITIs several times to renew the system liquid column in the DITI adapters. This ensures maximum pipetting accuracy.

The parameters of the Wash Tips command are as follows:

Tip Selection

Select the tips you want to wash.

Volume in Waste

Specify the volume of system liquid which should be used to flush the inside of the tips. Flushing takes place with the tips positioned above the waste of the specified wash station (tip height for fixed tips = Z-dispense; tip height for DITI adapters = Z-travel).

Volume in Cleaner

Specify the volume of system liquid which should be used to wash the outside of the tips. Washing takes place with the tips lowered into the cleaner of the specified wash station (tip height = Z-max). The wash cycle is skipped if you are flushing DITI adapters and *Volume in Cleaner* is ignored in this case.

Use Waste

Specify the worktable position for the waste you want to use by clicking on it in the Worktable Editor. You must first put a wash station with waste unit in the Worktable Editor at the required position. Alternatively, choose the required waste position from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected waste.

Use Cleaner

Specify the worktable position for the cleaner you want to use by clicking on it in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor at the required position. Alternatively, choose the required cleaner position from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected cleaner.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

The wash cycle is skipped if you are flushing DITI adapters and *Use Cleaner* is ignored in this case.

Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips. If you use the Fast Wash module, the volumes of liquid which are dispensed in the flushing and washing steps may differ significantly from the volumes you specify. This is due to accuracy limitations of the pump.

Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

Delay in Waste

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after flushing before moving the LiHa away from the waste (range: 0 - 1000 ms).

Delay in Cleaner

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after washing before moving the LiHa away from the cleaner (range: 0 - 1000 ms). The wash cycle is skipped if you are flushing DITI adapters and *Delay in Cleaner* is ignored in this case.

Retract with

Specify the speed with which you want to retract the tips from the cleaner (range: 0 - 100 mm/s). If the speed is too high, droplets may be dragged out of the cleaner and stick to the outside of the tips.

Airgap volume, Airgap speed

These settings are used to specify a system trailing airgap (STAG) which will be aspirated after washing the tips. Specify the required size of the airgap in µl and the aspiration speed for the airgap in µl/s. The system trailing airgap is used to prevent contamination by ensuring that the system liquid cannot come into contact with the liquid which will be aspirated in a subsequent pipetting command.

15.5 Periodic Wash Command

The Periodic Wash command is used to flush DITI adapters in a wash station at specified, regular intervals. It is not intended for flushing DITI tips.

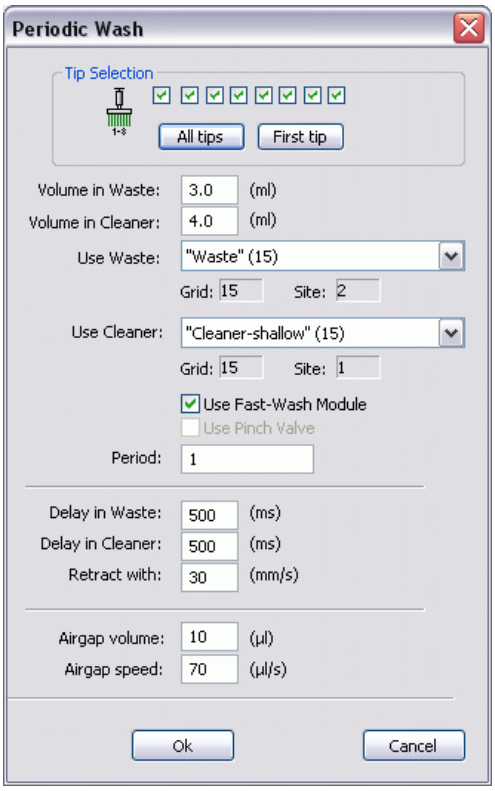


Fig. 15-5 *Periodic Wash command*

This command is used to flush the DITI adapters at specified, regular intervals when DITIs are replaced. The flushing takes place after the DITIs are dropped and before getting new ones. This should be done after replacing the DITIs several times to renew the system liquid column in the DITI adapters. This ensures maximum pipetting accuracy.

The Periodic Wash command is not executed at its line in the script, but affects subsequent Drop DITI and Get DITI commands. It also affects DITI replacement actions in worklists.

You can deactivate a previous Periodic Wash command by specifying another Periodic Wash command with the period set to 0 (zero).

The parameters of the Periodic Wash command are as follows:

Tip Selection

Select the DITI adapters you want to flush.

Volume in Waste

Specify the volume of system liquid which should be used to flush the DITI adapters (range: 0 - 100 ml). Flushing takes place with the tips positioned above the waste of the specified wash station (tip height for fixed tips = Z-dispense; tip height for DITI adapters = Z-travel).

Volume in Cleaner

Specify the volume of system liquid which should be used to wash the outside of the tips (range: 0.1 - 100 ml). Washing takes place with the tips lowered into the cleaner of the specified wash station (tip height = Z-max). The wash cycle is skipped if you are flushing DITI adapters and *Volume in Cleaner* is ignored in this case.

Use Waste

Specify the worktable position for the waste you want to use by clicking on it in the Worktable Editor. You must first put a wash station with waste unit in the Worktable Editor at the required position. Alternatively, choose the required waste position from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected waste.

Use Cleaner

Specify the worktable position for the cleaner you want to use by clicking on it in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor at the required position. Alternatively, choose the required cleaner position from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected cleaner.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

The wash cycle is skipped if you are flushing DITI adapters and *Use Cleaner* is ignored in this case.

Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

Period

Specify the number of DITI replacement actions after which Freedom EVOware should flush the DITI adapters.

Delay in Waste

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after flushing before moving the LiHa away from the waste (range: 0 - 1000 ms).

Delay in Cleaner

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after washing before moving the LiHa away from the cleaner (range: 0 - 1000 ms). The wash cycle is skipped if you are flushing DITI adapters and *Delay in Cleaner* is ignored in this case.

Retract with

Specify the speed with which you want to retract the tips from the cleaner. If the speed is too high, droplets may be dragged out of the cleaner and stick to the outside of the tips. *Retract with* is ignored if you are flushing DITI adapters.

Airgap volume, Airgap speed

These settings are used to specify a system trailing airgap (STAG) which will be aspirated after washing the tips. Specify the required size of the airgap in µl and the aspiration speed for the airgap in µl/s. The system trailing airgap is used to prevent contamination by ensuring that the system liquid cannot come into contact with the liquid which will be aspirated in a subsequent pipetting command.

15.6 Activate DITI Handling Command

Freedom EVOware provides special facilities to ensure that sufficient DITIs are present on the worktable for your script or process and to fetch new DITI racks as and when needed. In Freedom EVOware Standard, automatic DITI replacement is done using a DITI replacement script (sub-routine).

The Activate DITI Handling command, which is only available in Freedom EVOware Standard, activates the automatic DITI Handling feature in your pipetting script and specifies the DITI replacement script to use. Freedom EVOware Plus uses a different concept for automatic DITI handling.

Your script must include an Activate DITI Handling command for each DITI type you want to replace automatically.

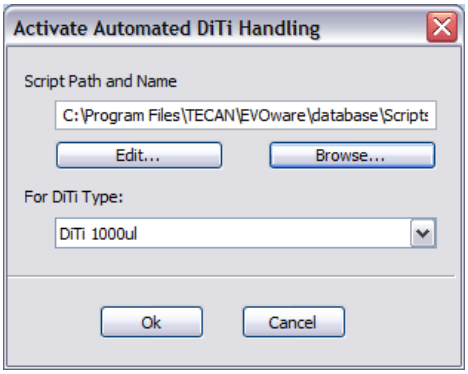


Fig. 15-6 *Activate DITI Handling command*

The parameters of the Activate DITI Handling command are as follows:

Script Path and Name

Specify the filename and location of the script (sub-routine) you want to use to replace DITI racks when all of the DITIs have been used. This is normally done using one or more Transfer Labware commands. The worktable location (grid, site) of the DITI racks which will need replacing during runtime is specified in the DITI replacement script using the pre-defined variables *Replace_Diti_Grid* and *Replace_DiTi_Site.* For each Get DITI command in your pipetting script, Freedom EVOware automatically sets these variables to the correct grid and site for the selected DITI type before executing the command.

Edit: Click this button if you want to open the specified script in a new window for editing and/or checking.

Browse: Click this button to look for existing scripts and to choose the one you want to use.

For DITI type

Choose the DITI type to which this command should apply. The list shows all of the LiHa DITI types which are defined in the labware database.

To de-activate the automatic DITI Handling feature again, use the Activate DITI Handling command and leave the *Script Path and Name* field blank.

See 17.1 “Using the Automatic DITI Handling feature”, 17-1 for more information.

15.7 Get DITIs Command

The Get DITIs command is used to pick up DITIs (disposable tips) of the specified type from a DITI rack. Freedom EVOware keeps track of their position on the worktable and automatically picks up the next available unused DITIs of the chosen type.

Note: *DiTi handling is automatic in Freedom EVOware Plus.*

This command is only shown in the Control Bar if you are using DiTis on the LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DITIs you must configure them manually (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22).

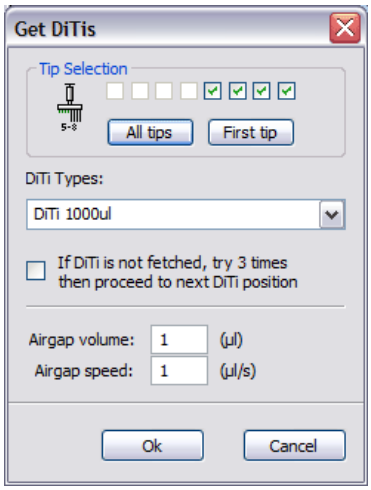


Fig. 15-7 *Get DITIs command*

The parameters of the Get DITIs command are as follows:

Tip Selection

Select the tips you want to pick up. You can only choose tips which are configured with DITIs.

DITI Type

Choose the required DITI type from the pull-down list. The list shows all of the LiHa DITI types which are defined in the labware database.

If DITI is not fetched, try 3 times and then proceed to next DITI position

If you do not check this checkbox and the DITIs could not be picked up, Freedom EVOware displays an error message and waits for user input.

If you check this checkbox and the DITIs could not be picked up, Freedom EVOware makes two more attempts before proceeding to the next DITI position and trying again.

Airgap volume, Airgap speed

These settings are used to specify a system trailing airgap (STAG) which will be aspirated after mounting the DITIs. Specify the required size of the airgap in µl and the aspiration speed for the airgap in µl/s. The system trailing airgap is used to prevent contamination by ensuring that the system liquid cannot come into contact with the liquid which will be aspirated in a subsequent pipetting command.

Also see 15.9 “Set DITI Position Command”, 15-15.

15.8 Drop DITIs Command

The Drop DITIs command is used to discard the specified DITIs into the specified DITI waste.

Note: *DiTi handling is automatic in Freedom EVOware Plus.*

This command is only shown in the Control Bar if you are using DiTis on the LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DITIs you must configure them manually (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22).

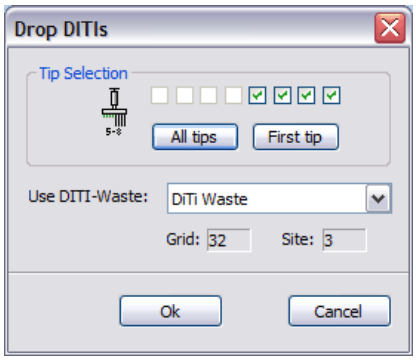


Fig. 15-8 *Drop DITIs command*

The parameters of the Drop DITIs command are as follows:

Tip Selection

Select the tips you want to discard. You can only choose tips which are configured with DITIs.

Use DITI Waste

Specify the worktable position for the DITI waste you want to use by clicking on the waste in the Worktable Editor. You must first put a DITI waste in the Worktable Editor at the required position. Alternatively, choose the required DITI waste from the pull down list. The list shows all of the DITI wastes which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected DITI waste.

15.9 Set DITI Position Command

If you are using DITIs, Freedom EVOware remembers the position in the DITI rack of the last DITI which was fetched. When starting a new run, the Get DITIs command starts picking up DITIs at the next available position. After loading a new DITI rack onto the worktable during script runtime (e.g. using the RoMa), you should use the Set DITI Position command in your script to set the DITI Position counter to 1. This ensures that the next DITI is fetched from position 1 rather than from the middle of the new rack.

You can specify the next position separately for each of the available DITI types (i.e. DITI racks on the worktable).

Note: *If you want to specify the next DITI position manually before the script or process is started, use the direct command Set DITI Position (see 5.4.1.3 "Direct commands", 5-10) or create a maintenance script which contains the Set DITI Position command (see 6.4.2 "Run Maintenance", 6-10).*

Note: *DiTi handling is automatic in Freedom EVOware Plus.*

This command is only shown in the Control Bar if you are using DiTis on the LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DITIs you must configure them manually (see 8.4.2.1 "LiHa (Liquid Handling Arm)", 8-22).

If your pipetting instrument is fitted with two liquid handling arms, the Set DITI Position command will be provided in the Control Bar for both arms. However, please note that the same DITI position counter (and the same pool of unused DITIs) is used by both arms.

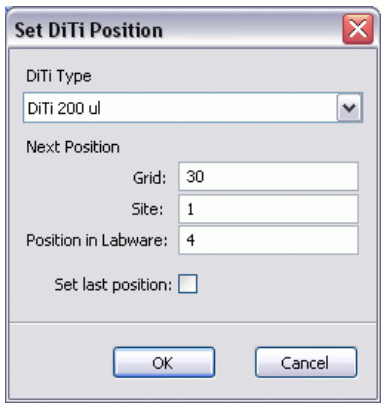


Fig. 15-9 *Set DITI Position command*

The parameters of the Set DITI Position command are as follows:

DITI type

Choose the DITI type whose position you want to set. The list shows all of the LiHa DITI types which are defined in the labware database. DITI types are assigned to DITI racks in the labware definition for the rack (see 9.4.1 “Editing Labware, Well Dimensions Tab”, 9-19).

Next DITI position

Grid, Site: Specify the worktable position of a DITI rack containing unused DITIs of this type by clicking on the rack in the Worktable Editor. You can also specify numeric constants or variables. The specified grid and site must contain a DITI rack.

Position in labware: Specify the labware position in the DITI rack for the next available unused DITI of this type. You can also specify a numeric constant or a variable. Freedom EVOware counts labware positions from rear to front and then from left to right.

Set last position

If you have activated the feature *Optimize positions when fetching DITIs*, Freedom EVOware fetches new DITIs either starting from the beginning of the DITI rack or starting from the end of the DITI rack, depending on the situation (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22, *Optimize positions when fetching DITIs*). In this case, Freedom EVOware maintains two counters for the last used DITI position (for DITIs which are taken from the beginning of the rack and for DITIs which are taken from the end of the rack). Check this checkbox if you want to set the last used DITI position for the end counter instead of for the beginning counter.

If you have activated the feature *Optimize positions when fetching DITIs*, after loading a new DITI rack onto the worktable during script runtime you should use the Set DITI Position command twice in your script, to set the beginning counter to 1 and the end counter to 96.

The *Set last position checkbox* is inactive (grey) if you have not activated *Optimize positions when fetching DITIs*. If you have previously specified the last used DITI position, it will be ignored during script execution.

15.10 Pick Up DITIs Command

The Pick Up DITIs command is used to pick up DITIs which have already been used and put back into a DITI rack with the Set DITIs Back command. You must specify the DITIs you want to pick up.

Note: *DiTi handling is automatic in Freedom EVOware Plus.*

This command is only shown in the Control Bar if you are using DiTis on the LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DITIs you must configure them manually (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22).

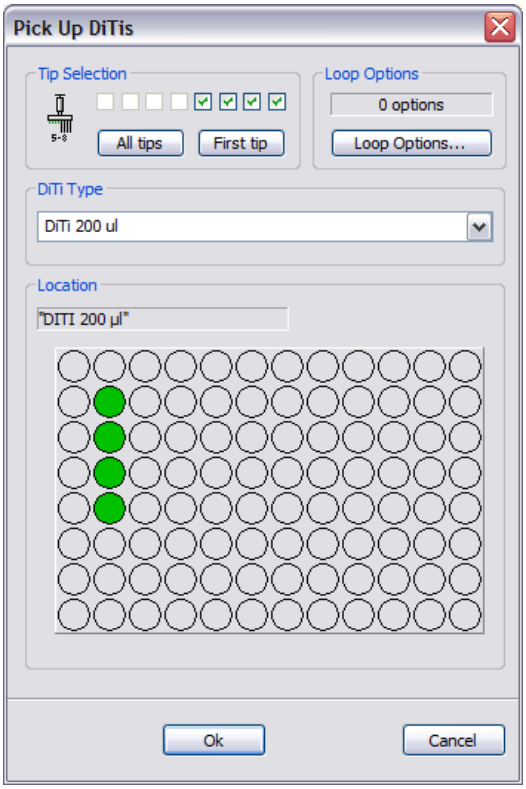


Fig. 15-10 *Pick Up DITIs command*

The parameters of the Pick Up DITIs command are as follows:

Tip Selection

Select the tips you want to pick up. You can only choose tips which are configured with DITIs.

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

DITI Type

Choose the required DITI type from the pull-down list. The list shows all of the LiHa DITI types which are defined in the labware database.

Location

Select the DITI rack where you want to pick up the DITIs by clicking on the rack in the Worktable Editor. The gray (protected) field at the top of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label). Now click on the required well(s).

15.11 Set DITIs Back Command

The Set DITIs Back command is used to return used DITIs to specified positions on a DITI rack for later use. This command requires the Lower DITI Eject option.

Note: *DiTi handling is automatic in Freedom EVOware Plus.*

This command is only shown in the Control Bar if you are using DiTis on the LiHa. Freedom EVOware does not detect the LiHa tip type automatically. If you are using DITIs you must configure them manually (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22).

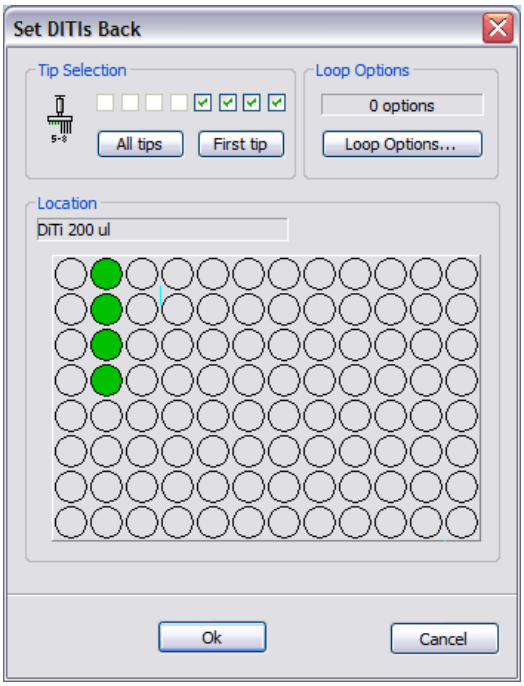


Fig. 15-11 *Set DITIs Back command*

The parameters of the Set DITIs Back command are as follows:

Tip Selection

Select the tips you want to put down. You can only choose tips which are configured with DITIs.

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Location

Select the DITI rack where you want to put down the DITIs by clicking on the rack in the Worktable Editor. Then click on the required well(s). The gray (protected) field at the top of the panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

15.12 Pickup ZipTip Command

The Pickup ZipTip command is used to pick up ZipTips. ZipTips are disposable tips which are pre-filled with liquid and thus do not need an aspirate command. Freedom EVOware keeps track of their position on the worktable and automatically picks up the next available unused ZipTips of the chosen type.

The Pick Up ZipTip command automatically aspirates a specified volume of air before picking up the tips. The same volume should be chosen in the subsequent Dispense command, which then ejects the pre-filled liquid into the well.

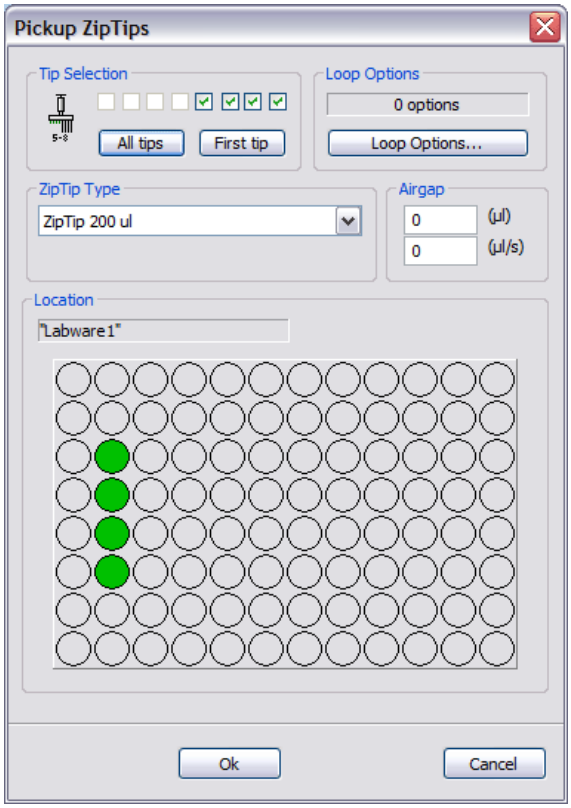


Fig. 15-12 *Pickup ZipTip command*

The parameters of the Pickup ZipTip command are as follows:

Tip Selection

Select the tips you want to pick up. You can only choose tips which are configured with DITIs or ZipTips.

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

ZipTip Type

Choose the required ZipTip type from the pull-down list. ZipTips are stored in DITI racks. The list shows all of the LiHa DITI and ZipTip types which are defined in the labware database.

Airgap

Choose the required size of the airgap in µl and the aspiration speed for the airgap in µl/s.

Location

Select the DITI rack where you want to pick up the ZipTips by clicking on the rack in the Worktable Editor. The gray (protected) field at the top of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label). Now click on the required well(s).

ZipTips can be washed after use in the Active WashStation (see 15.23 “Active WashStation Command”, 15-36).

Also see 15.9 “Set DITI Position Command”, 15-15.

15.13 Detect Liquid Command

Liquid level detection is one of the options available for aspirating and dispensing and can be individually defined for each liquid class. The Detect Liquid command is used to carry out liquid level detection without pipetting and reports the liquid volume for each of the chosen wells in the labware.

The volumes are returned in a set of variables DETECTED_VOLUME_x, where x is the tip number.

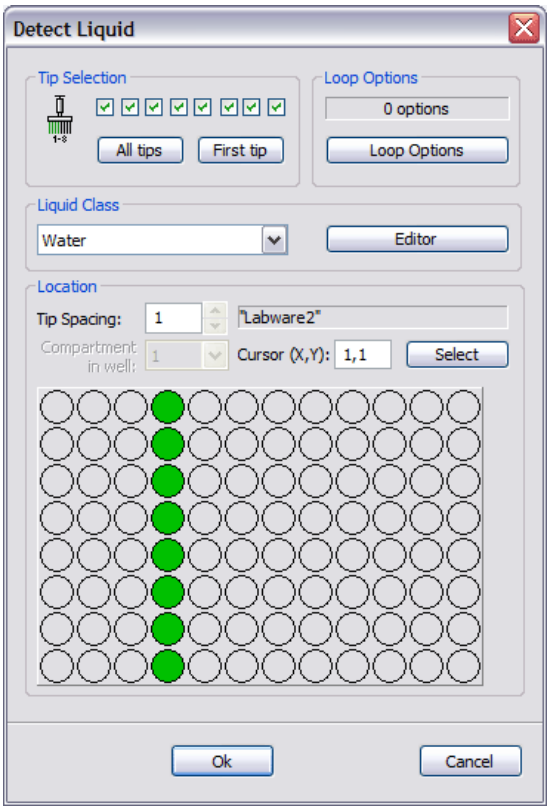


Fig. 15-13 *Detect Liquid command*

The parameters of the Detect Liquid command are as follows:

Tip Selection

Select the tips you want to use.

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1).

Location

Select the labware which you want to check by clicking on the labware in the Worktable Editor. The gray (protected) field at the top right of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label). Now click on the required well(s).

Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. You can choose a different tip spacing for the source labware and the destination labware. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

Select: Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landcape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

15.14 Te-Fill Aspirate Command

The Te-Fill option uses a bi-directional pump instead of the diluter to aspirate and dispense large volumes of liquid, for example buffer solutions.

The Te-Fill can be optionally equipped with a 6-way valve, which allows you to switch between six different liquid containers. If fitted, the 6-way valve must be activated in the Configuration Tool (see 8.4.2.4 “Te-Fill option”, 🗎 8-30). Also use the Configuration Tool to assign the names of the liquids you want to use to the channels of the 6-way valve (see 8.4.2.6 “6-way valve for Te-Fill”, 🗎 8-31). The assigned names will then be shown in this command in the *Channel / Liquid* pull-down list.

The Te-Fill Aspirate command is used to pick up liquid from specified positions on the worktable using the Te-Fill option.

During runtime, the pipetting instrument will switch from using the diluter to using the bi-directional pump and switch back again after pipetting - you do not need to use the Te-Fill Switch Valve command for this purpose.

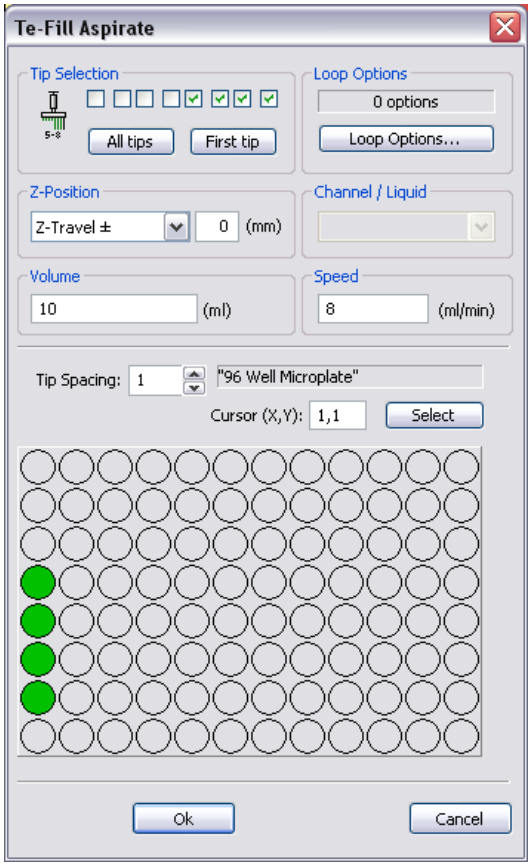


Fig. 15-14 *Te-Fill Aspirate command*

The parameters of the Te-Fill Aspirate command are as follows:

Tip Selection

Select the tips you want to use. You can only select tips which are configured with the Te-Fill option (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22, Te-Fill option).

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. You can choose different loop options for the source and the destination. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Z-Position

Choose the Z-Position to which the selected tips should be lowered for pipetting. All other tips remain at the currently applicable Z-Travel height. Specify a Z offset if required. A positive value for the offset lowers the tips.

Channel / Liquid

If the Te-Fill is fitted with the 6-way valve option, choose the channel (liquid container) you want to use. The pull-down list is not available if the 6-way valve is not present and/or not activated.

During runtime, the pipetting instrument will select the correct liquid channel automatically - you do not need to use the Te-Fill Switch Valve command for this purpose.

Volume

Specify the volume that you want to aspirate.

Speed

Specify the required pipetting speed for each tip. The available range depends on how many tips you have selected. The Te-Fill pump has a range of 8 to 80 ml/min. If you have selected e.g. four tips, the range for this field is 2 to 20 ml/min.

Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

Location

Select the labware for the source by clicking on the labware in the Worktable Editor. Then click on the required source well(s). The gray (protected) field then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

Select: Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landcape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

15.15 Te-Fill Dispense Command

The Te-Fill option uses a bi-directional pump instead of the diluter to aspirate and dispense large volumes of liquid, for example buffer solutions.

The Te-Fill can be optionally equipped with a 6-way valve, which allows you to switch between six different liquid containers. If fitted, the 6-way valve must be activated in the Configuration Tool (see 8.4.2.4 “Te-Fill option”, 🗎 8-30). Also use the Configuration Tool to assign the names of the liquids you want to use to the

channels of the 6-way valve (see 8.4.2.6 “6-way valve for Te-Fill”, 8-31). The assigned names will then be shown in this command in the *Channel / Liquid* pull-down list.

The Te-Fill Dispense command is used to dispense liquid to specified positions on the worktable using the Te-Fill option.

During runtime, the pipetting instrument will switch from using the diluter to using the bi-directional pump and switch back again after pipetting - you do not need to use the Te-Fill Switch Valve command for this purpose.

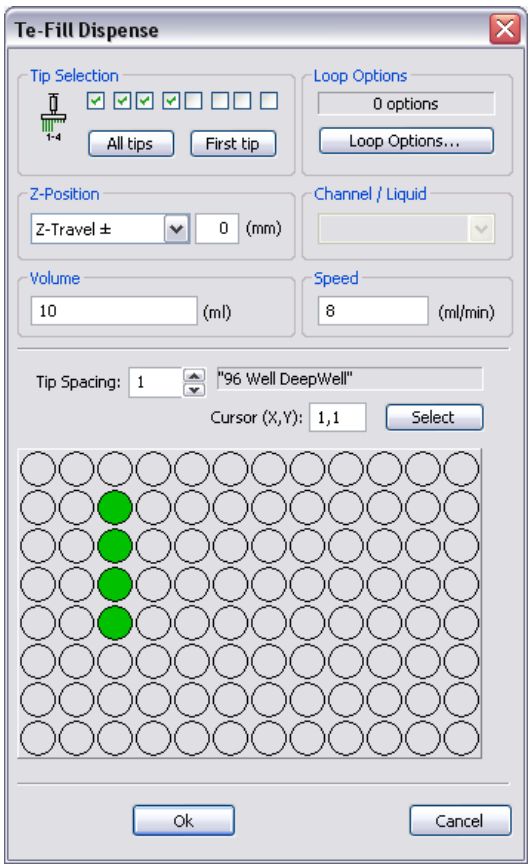


Fig. 15-15 *Te-Fill Dispense command*

The parameters of the Te-Fill Dispense command are as follows:

Tip Selection

Select the tips you want to use. You can only select tips which are configured with the Te-Fill option (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22, Te-Fill option).

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. You can choose different loop options for the source and the destination. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Z-Position

Choose the Z-Position to which the selected tips should be lowered for pipetting. All other tips remain at the currently applicable Z-Travel height. Specify a Z offset if required. A positive value for the offset lowers the tips.

Channel / Liquid

If the Te-Fill is fitted with the 6-way valve option, choose the channel (liquid container) you want to use. The pull-down list is not available if the 6-way valve is not present and/or not activated.

During runtime, the pipetting instrument will select the correct liquid channel automatically - you do not need to use the Te-Fill Switch Valve command for this purpose.

Volume

Specify the volume that you want to aspirate.

Speed

Specify the required pipetting speed for each tip. The available range depends on how many tips you have selected. The Te-Fill pump has a range of 8 to 80 ml/min. If you have selected e.g. four tips, the range for this field is 2 to 20 ml/min.

Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells of the labware. A tip spacing of 2 will select every other well of the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

Location

Select the labware for the source by clicking on the labware in the Worktable Editor. Then click on the required source well(s). The gray (protected) field then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

Select: Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landcape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

15.16 Te-Fill Prime Command

The Te-Fill option uses a bi-directional pump instead of the diluter to aspirate and dispense large volumes of liquid, for example buffer solutions.

The Te-Fill can be optionally equipped with a 6-way valve, which allows you to switch between six different liquid containers. If fitted, the 6-way valve must be activated in the Configuration Tool (see 8.4.2.4 “Te-Fill option”, 8-30). Also use the Configuration Tool to assign the names of the liquids you want to use to the channels of the 6-way valve (see 8.4.2.6 “6-way valve for Te-Fill”, 8-31). The assigned names will then be shown in this command in the *Channel / Liquid* pull-down list.

The Te-Fill Prime command is used to prime the liquid channel of the Te-Fill option.

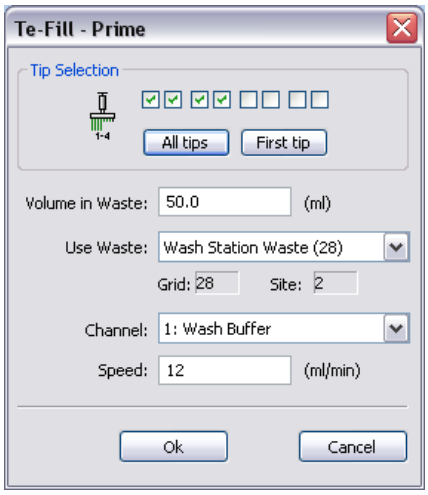


Fig. 15-16 *Te-Fill Prime command*

The liquid channel should be primed as often as necessary, e.g. after a pipetting sequence, before taking a new sample, if you want to use a different liquid channel in subsequent pipetting steps and if the liquid needs to be replaced due to aging.

DITI adapters should be flushed after replacing the DITIs several times to renew the liquid column in the DITI adapters. This ensures maximum pipetting accuracy. DITIs should not normally be flushed. If you are using DITIs, make sure in your script that there are none attached when this command is executed.

The parameters of the Te-Fill Prime command are as follows:

Tip Selection

Select the tips you want to prime. You can only select tips which are configured with the Te-Fill option (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22, Te-Fill option).

Volume in Waste

Specify the volume of liquid which should be used to prime the liquid channel and the tips. Priming takes place with the tips positioned above the waste of the specified wash station (tip height for fixed tips = Z-dispense; tip height for DITI adapters = Z-travel).

Use Waste

Specify the worktable position for the waste you want to use by clicking on it in the Worktable Editor. You must first put a wash station with waste unit in the Worktable Editor at the required position. Alternatively, choose the required waste position from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor.

The gray (protected) fields show the worktable coordinates of the selected waste.

Channel / Liquid

If the Te-Fill is fitted with the 6-way valve option, choose the channel (liquid container) you want to use. The pull-down list is not available if the 6-way valve is not present and/or not activated.

During runtime, the pipetting instrument will select the correct liquid channel automatically - you do not need to use the Te-Fill Switch Valve command for this purpose.

Speed

Specify the required priming speed for each tip. The available range depends on how many tips you have selected. The Te-Fill pump has a range of 8 to 80 ml/min. If you have selected e.g. four tips, the range for this field is 2 to 20 ml/min.

15.17 Te-Fill Switch Valve Command

The Te-Fill option uses a bi-directional pump instead of the diluter to aspirate and dispense large volumes of liquid, for example buffer solutions.

The Te-Fill can be optionally equipped with a 6-way valve, which allows you to switch between six different liquid containers. If fitted, the 6-way valve must be activated in the Configuration Tool (see 8.4.2.4 “Te-Fill option”, 8-30). Also use the Configuration Tool to assign the names of the liquids you want to use to the channels of the 6-way valve (see 8.4.2.6 “6-way valve for Te-Fill”, 8-31). The assigned names will then be shown in this command in the *Channel / Liquid* pull-down list.

With the Te-Fill Aspirate, Dispense and Prime commands, the pipetting instrument will switch during runtime from using the diluter to using the bi-directional pump and switch back again after pipetting - you do not need to use the Te-Fill Switch Valve command for this purpose.

The Te-Fill Switch Valve command is used for special applications which require the Te-Fill liquid path to be selected but without aspirating or dispensing.

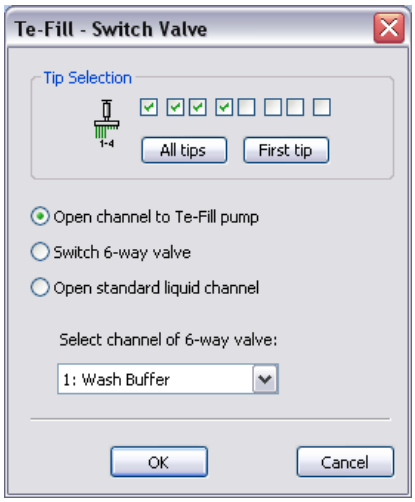


Fig. 15-17 *Te-Fill Switch Valve command*

The parameters of the Te-Fill Switch Valve command are as follows:

Tip Selection

Select the tips you want to use. You can only select tips which are configured with the Te-Fill option (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 8-22, Te-Fill option).

Open channel to Large Volume Pump

Position the valves in the pipetting instrument to select the liquid path through the bi-directional pump instead of through the diluter.

Switch 6-way valve

If the Te-Fill is fitted with the 6-way valve option, choose the channel (liquid container) you want to use. This option is not available if the 6-way valve is not present and/or not activated.

Open standard liquid channel

Position the valves in the pipetting instrument to select the liquid path through the diluter instead of through the bi-directional pump.

Channel / Liquid

If the Te-Fill is fitted with the 6-way valve option, choose the channel (liquid container) you want to use. The pull-down list is not available if the 6-way valve is not present and/or not activated.

15.18 Activate PMP Command

The Activate PMP command is used to activate the PMP (Pressure Monitored Pipetting) function at the appropriate point in your pipetting script. You must do this before getting (mounting) the PMP-controlled DiTis.

This command is only shown in the Control Bar if you are using DiTis and you have enabled the PMP option (see 17.6.1 “Activating the PMP Option”, 17-17).

Certain restrictions apply to the pipetting commands which are allowed between the Activate PMP command and a subsequent Deactivate PMP command (see 17.6.2 “Permissible sequence of script commands for the PMP option”, 17-18).

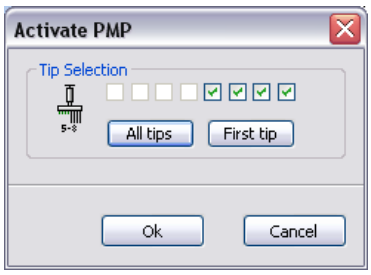


Fig. 15-18 *Activate PMP command*

The parameters of the Activate PMP command are as follows:

Tip Selection

Select the tip or tips whose PMP function you want to activate. You can only choose tips which are configured with DITIs and with the PMP option.

15.19 Deactivate PMP Command

The Deactivate PMP command is used to deactivate the PMP (Pressure Monitored Pipetting) function at the appropriate point in your pipetting script. You must do this after finishing the pipetting sequence and dropping the DITIs. All PMP-controlled DITIs must be dropped before deactivating PMP.

This command is only shown in the Control Bar if you are using DiTis and you have enabled the PMP option (see 17.6.1 “Activating the PMP Option”, 17-17).

Certain restrictions apply to the pipetting commands which are allowed between the Activate PMP command and a subsequent Deactivate PMP command (see 17.6.2 “Permissible sequence of script commands for the PMP option”, 17-18).

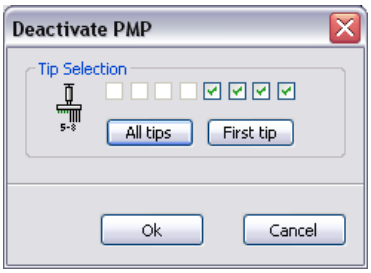


Fig. 15-19 *Deactivate PMP command*

The parameters of the Deactivate PMP command are as follows:

Tip Selection

Select the tip or tips whose PMP function you want to deactivate. You can only choose tips which are configured with DITIs and with the PMP option. You will get a script error if you select a tip position whose PMP function was not previously activated with the Activate PMP command.

15.20 Tip Alignment Check Command

This command is used to check and re-adjust the alignment of the Liquid Handling Arm (LiHa) during script runtime. It is also able to detect bent tips. It is only intended for the LiHa of the Freedom EVO pipetting instrument and is normally only necessary if you are using microplates with 1536 wells or other high precision labware. The Tip Alignment Check command should only be necessary for long scripts which involve a large number of arm movements. Please note that this command performs a quick test and delivers less precise results than the *Setup & Service* software.

Labware with 1536 wells has a very high packing density and the wells have a diameter of only 1.7 mm. The high precision requires a special LiHa design. In addition, 1536-well labware needs to be placed on a specially designed carrier. The special carrier and the high-precision LiHa are key components of the Tecan Positioning System (Te-PS).

Arm alignment is done using the Te-PS Sensor plate, which is placed on the Te-PS Carrier. The tip alignment process moves each of the pipetting tips past the sensor plate, and lasers are used to accurately measure the position.

The tip alignment can also be tested manually before or after running the script (see 15.27 “Manual Tip Alignment Command”, 15-57).

Before starting a script which contains the Tip Alignment Check command, you must place the Te-PS Sensor plate on one of the sites of the Te-PS Carrier. Check that the sensor plate is properly connected to the pipetting instrument using the supplied cable.

In addition, you must put the Te-PS Sensor plate at the same grid and site position in Freedom EVOware's Worktable Editor.

If necessary, the *Tip Alignment Check* command can also be used to check the tip alignment with other carrier and labware types. The test should then be carried out with the Te-PS Sensor plate placed on the same carrier which will be used for pipetting. However, due to the mechanical design and other factors, the Te-PS Carrier can achieve a higher alignment accuracy than conventional carrier types.

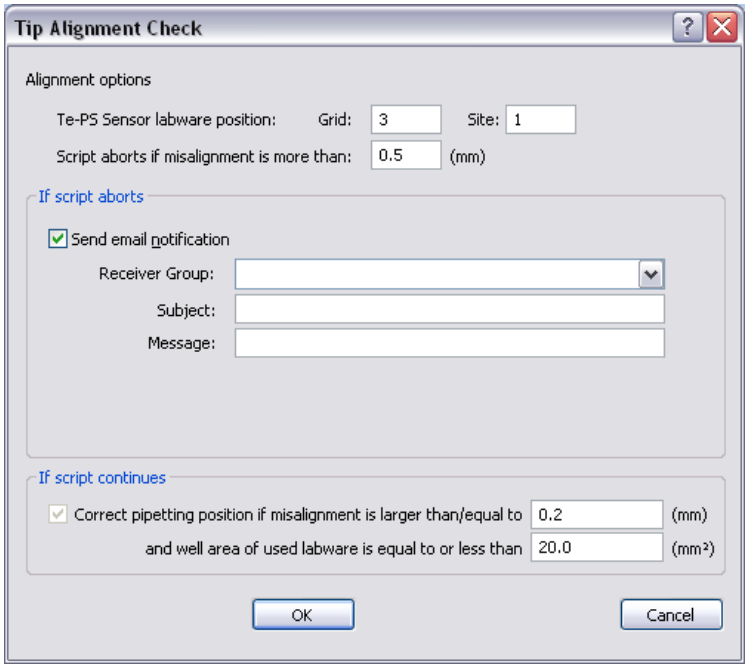


Fig. 15-20 *Tip Alignment Check command*

The parameters of the Tip Alignment command are as follows:

Alignment options panel

Te-PS Sensor plate position

Specify the location of the Te-PS Sensor plate by clicking on the sensor plate in the Worktable Editor.

Script aborts if misalignment is more than ...

Specify a maximum value in mm for tip misalignment above which the script should be aborted. The maximum allowed misalignment depends on the radius and shape of the wells in the labware that you are using. It should be less than *well radius - tip radius*. For 1536-well labware, an appropriate value for this parameter is 0.5 mm.

If tip misalignment exceeds the specified value, the instrument must be re-calibrated by authorized personnel using the *Setup & Service* software. See 1.2 "Reference Documents", 1-3 for information on this software.

If script aborts panel

Send email notification

Check this checkbox if you want to inform an operator or maintenance personnel by eMail if the script has aborted due to a tip alignment problem.

Freedom EVOware can be configured to send messages about system events and error situations to specific groups of users. The groups are configured with the Configuration Tool. The notification feature requires the MAPI service to be installed (see 8.3.2 “Notifications Section”, 8-12). Choose the user group which should be notified from the pull-down list. You must configure the groups first.

Subject: Specify the required subject of the email.

Message: Specify the message you want to send.

If script continues panel

Correct pipetting position if misalignment is larger than/equal to ...

If the tip misalignment is not too serious and the script can continue, specify the level of misalignment above which automatic re-adjustment of the LiHa axes should be undertaken (range: 0.1 - 1.0 mm). For 1536-well labware, an appropriate value for this parameter is 0.2 mm. The value you choose must be less than the value in *Script aborts if misalignment is more than ...*.

The misalignment correction is only made for the current script and is not stored. If subsequent scripts use labware with 1536 wells, they should also include the Tip Alignment Check command.

and well area of used labware is equal to or less than

You can limit the correction to small wells only by specifying the area of the wells.

15.21 Move LiHa Command

The Move LiHa command is used to move the liquid handling arm (LiHa) from one position to another without performing an Aspirate or Dispense operation.

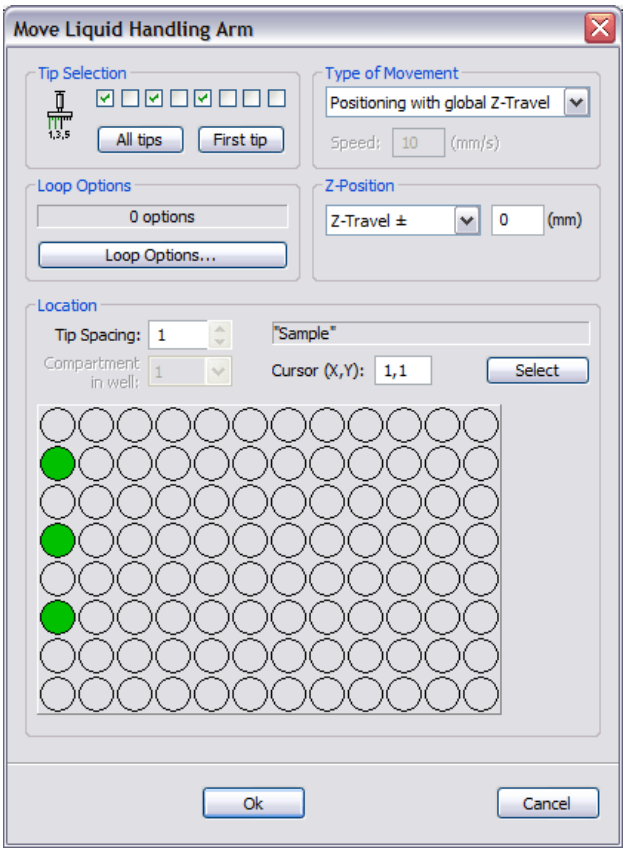


Fig. 15-21 *Move LiHa command*

The parameters of the Move LiHa command are as follows:

Tip Selection

Select the tips you want to use.

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Type of movement

Choose X-Move, Y-Move or Z-Move to move only one axis of the LiHa. You can then specify the speed of the movement. Z-Move only moves the selected tips.

The options *Positioning with global Z-travel*, *Positioning with local Z-travel* and *Positioning with variable Z-travel* move the LiHa to the labware at maximum speed. The chosen height for Z-Travel (the tip height which is used during the arm movement) only applies to the selected tips. The Z position of the unselected tips remains unchanged.

If you choose *Positioning with variable Z-travel*, the required Z-Travel height is specified using the pre-defined variable LIHA_MOVE_HEIGHT (see 14.1.4.7 “LIHA_MOVE_HEIGHT”, 14-5).

Z-Position

Unless you have chosen X-Move or Y-Move in the *Type of Movement* field, you can specify the Z-Position to which the selected tips should be lowered at the end of the LiHa movement. The Z position of the unselected tips remains unchanged. Choose the required Z-position and then specify a Z offset in mm if required. A positive value for the offset lowers the tips.

Tip Spacing

The Tip Spacing parameter controls the distance between adjacent pipetting tips for this command. You can choose a different tip spacing for the source labware and the destination labware. Tip spacing is only relevant if you want to use more than one tip. A tip spacing of 1 means that the tips will be spread to match the distance between adjacent wells in the labware. A tip spacing of 2 will select every other well in the labware. You can only choose values for tip spacing which are meaningful for the labware geometry.

The liquid handling arm achieves the highest mechanical accuracy when the tips are not spread. For high-density labware such as 1536-well microplates, you should choose tip spacing such that the tips are adjacent to one another (physical tip spacing 9 mm). Accordingly, for 1536-well microplates you should set tip spacing to 4 (every fourth well).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Select the labware which you want to use by clicking on the labware in the Worktable Editor. Then click on the required well(s). The gray (protected) field at the top right of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label). If you have chosen a movement which changes the Z position of the tips, this only applies to the selected tips. The Z position of the unselected tips remains unchanged (see *Type of movement* and *Z-Position*, above).

Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

Select: Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. For example, if you have chosen to use 8 tips and you are pipetting to a 96-well microplate in landcape orientation, you can only choose the required x coordinate (the y coordinate must be 1).

15.22 Waste Command

The Waste command is used to control the vacuum-assisted waste (instrument option for viscous liquids which creates a partial vacuum in the waste bottles).

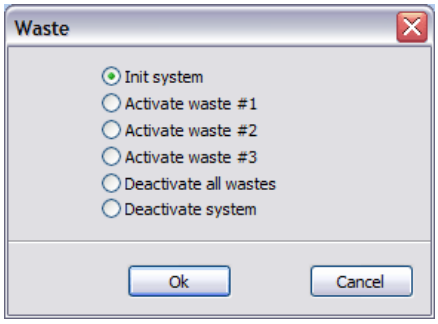


Fig. 15-22 *Waste command*

In contrast to the standard instrument waste, the vacuum-assisted waste lets you use up to three waste bottles which are operated with a partial vacuum (suction). This allows you to discard different waste liquids into different containers if they should not be allowed to mix. The waste command is typically used before a Wash tips command.

The parameters of the Waste command are as follows:

Init system

This command starts the vacuum pump. Due to the time needed to build up the vacuum, you can specify this command at an earlier stage in your script to ensure that the vacuum is present when you want to apply it with the *Activate waste* command.

Activate waste #1

This command applies the vacuum to waste # 1. If no previous *Init system* command was specified, *Activate waste #1* also starts the vacuum pump.

Activate waste #2

This command applies the vacuum to waste # 2. If no previous *Init system* command was specified, *Activate waste #2* also starts the vacuum pump.

Activate waste #3

This command applies the vacuum to waste # 3. If no previous *Init system* command was specified, *Activate waste #3* also starts the vacuum pump.

Deactivate all wastes

This command disconnects all wastes from the vacuum supply.

Deactivate system

This command switches off the vacuum pump. If you do not specify a *Deactivate system* command in your script, the vacuum pump will be switched off automatically when you quit Freedom EVOware.

15.23 Active WashStation Command

The Active WashStation command is used to control the pressure pump of the Active WashStation. The Active WashStation command is mainly intended for ZipTips.

Standard tips are washed in a wash station using the Wash Tips command, which moves the LiHa over the wash station and flushes the system liquid through the tips and into the waste. ZipTips cannot be flushed and are washed after use in the Active WashStation. The LiHa must be positioned above the Active WashStation with a Move Liha command before executing the Active WashStation command.

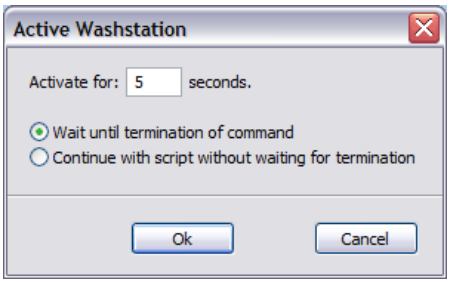


Fig. 15-23 *Active WashStation command*

The parameters of the Active WashStation command are as follows:

Time of activation in seconds

Specify the time of pump activation in seconds (range: 1 to 999 seconds).

Wait until termination of command

Freedom EVOware normally continues with subsequent commands in the pipetting script even if the pressure pump is still busy. This option causes the script to wait for the pressure pump to finish before continuing.

Continue with script without waiting for termination

This option causes the pipetting script to continue without waiting for the pressure pump to finish.

15.24 Worklist Command

The Worklist command is used to load a worklist file or run previously loaded worklist files. A worklist file is a text file containing pipetting instructions. It contains information on source and destination positions and the volumes to pipette. Worklists can be created using a plain text editor (see 15.24.2 “Worklist File Format”, 15-39). They can also be created automatically by the Worklist Import command (see 15.25 “Worklist Import Command”, 15-46).

If your pipetting instrument is fitted with two liquid handling arms (and you have installed drivers for both of them), there will be two Worklist commands in the Control Bar. Use the “Worklist” command if you want the worklist to use the first LiHa. Use the “Worklist 2” command if you want the worklist to use the second LiHa. The commands are otherwise identical.

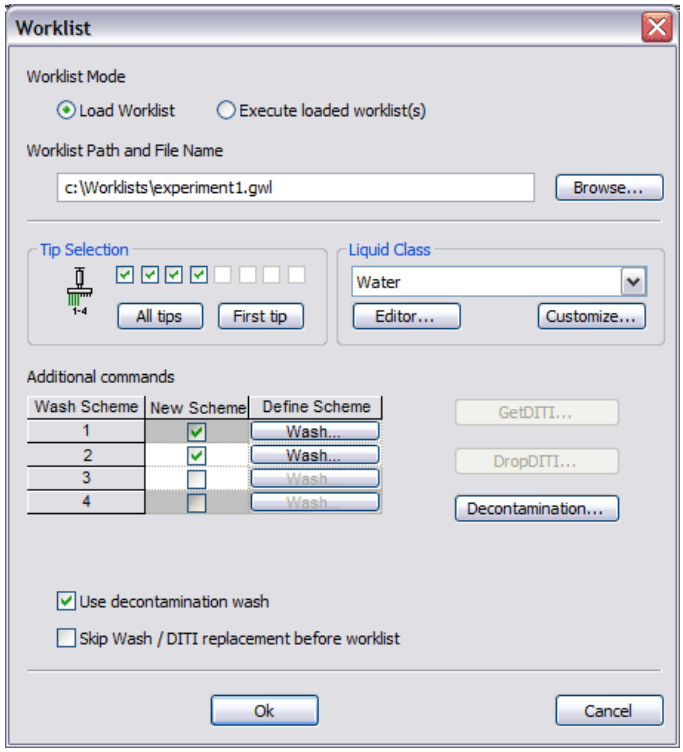


Fig. 15-24 *Worklist command*

The parameters of the Worklist command are as follows:

Worklist Mode

If you want to execute a worklist in an Freedom EVOware script, you must first load it in the script. Insert a Worklist command and click *Load Worklist* to load the worklist file and specify additional parameters for the pipetting operations.

Then insert another Worklist command in a later line of your script and click *Execute loaded worklist(s)* to run the worklist file. In this mode, all other parameters in the command are disabled and cannot be modified.

You can load several worklists by inserting several *Load Worklist* commands in your script. In this case, a single *Execute loaded worklist(s)* command runs all of the worklists which you have loaded. They will be executed in chronological order of loading. Freedom EVOware keeps a track of the worklists which have been run, and a second *Execute loaded worklist(s)* command will not run them again unless you have reloaded them.

Worklist (Path and Name)

Specify the file name and location of the worklist file (*.gwl). Enter the path and file name directly or click Browse and choose an existing file.

Tip Selection

Select the tips you want to use. If the worklist file specifies the tip selection (with the TipMask parameter) it overrides the settings you make here.

Note: *You cannot use a mixture of tip types (fixed tips and DITIs) in the same worklist. As soon as you choose a fixed tip, you can no longer choose any DITIs and vice versa. If the LiHa is fitted with a mixture of tip types, uncheck all of the checkboxes to switch from using fixed tips to DITIs, or vice versa.*

Liquid Class

You can choose a different liquid class for each source labware and for the destination labware. Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Aspirate or Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

If the worklist file specifies the liquid class (with the LiquidClass parameter) it overrides the settings you make here.

Additional Commands

If you want to use standard tips in the worklist, the Worklist command lets you specify up to four wash schemes which are executed sequentially.

Check the first checkbox in the New Scheme column and click the Wash button to configure the settings to use for washing the tips. The tips should be washed between aspirations from different source wells. Tip washing is specified in the worklist file with the W record.

If required, click additional checkboxes in the New Scheme column to configure additional wash schemes. The wash schemes are selected in the worklist using the worklist records W1, W2, W3 or W4. To ensure compatibility with existing worklists, W also selects the first wash scheme.

If you want to use DITIs in the worklist, click the **Get DITI** and **Drop DITI** buttons to configure the settings to use for replacing the DiTis. The DITIs should be replaced between aspirations from different source wells. DITI replacement is specified in the worklist file with the W record. Insert a Periodic Wash command in your script before the Worklist command if you want to flush the DITI adapters when the DITIs are replaced (see 15.5 “Periodic Wash Command”, 15-10).

You cannot use a mixture of tip types (fixed tips and DITIs) in the same worklist. The Get DITI and Drop DITI buttons will be inactive (grey) as soon as you choose a fixed tip with the Tip Selection checkboxes. Conversely, the Wash button will be inactive (grey) as soon as you choose a DITI with the Tip Selection checkboxes.

Use decontamination wash: Check this checkbox if you want to carry out a decontamination wash before the main wash procedure. Then click the **Decontamination** button to specify the settings (see 15.24.1 “Decontamination Wash Settings”, 15-39).

Skip Wash / DITI replacement before worklist: When you execute a worklist, Freedom EVOware normally washes the tips (if you are using fixed tips) or replaces the DITIs (if you are using DITIs) before starting to execute the worklist commands (this initial wash is done using the first wash scheme which you configured in the Worklist command). Check this checkbox if you do not want to wash the tips or replace the DITIs before executing the worklist commands (for example because you have already washed the tips in a previous script command).

15.24.1 Decontamination Wash Settings

The decontamination wash operation soaks the tips in the specified liquid for a specified time. It can be used e.g. to remove traces of sticky liquids from the tips and is carried out before the main wash procedure:

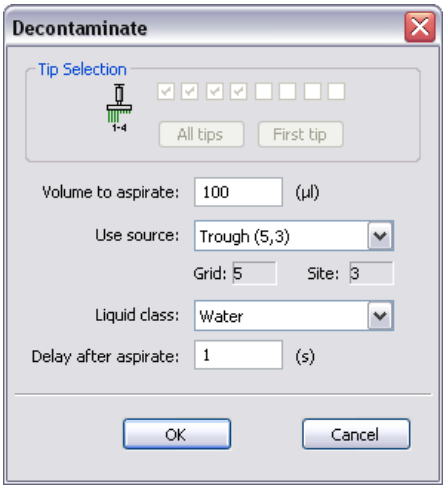


Fig. 15-25 *Worklist command - Decontamination Wash parameters*

Decontamination Wash is specified in the worklist file with the WD record.
The parameters of the decontamination wash operation are as follows:

Tip Selection

The tip selection is shown for information only and cannot be changed. The decontamination wash uses the same tip selection as the main wash procedure.

Volume to aspirate

Specify the volume of wash liquid you want to aspirate (range: 1 to 1000 µl).

Use source

The wash liquid for the decontamination wash is aspirated from a trough (liquid container). Choose the required trough from the pull down list. The list shows all troughs which are currently positioned in the Worktable Editor.

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

Delay after aspirate

Specify how long you want to soak the tips (range: 1 to 1800 s).

15.24.2 Worklist File Format

A worklist file is a text file containing pipetting instructions. The worklist commands consist of individual lines (or *records*). Seven different record types are available: Aspirate, Dispense, Wash Tips / Replace DITIs, Flush, Break, Set DITI Type and Comment. Each record starts with a single character indicating the type and is followed by one or more parameters. The parameters are separated

by semicolons. Some of the parameters are optional (see later) and some record types have no parameters.

The **Aspirate** record has the following structure:

A*;RackLabel;RackID;RackType;Position;TubeID;Volume;LiquidClass;TipType ;TipMask;ForcedRackType*

Each Aspirate record specifies the aspiration parameters for a single tip (the next unused tip from the tip selection you have specified).

The **Dispense** record has the following structure:

D*;RackLabel;RackID;RackType;Position;TubeID;Volume;LiquidClass;TipType ;TipMask;ForcedRackType*

Each Dispense record specifies the dispensing parameters for a single tip. It uses the same tip which was used by the preceeding Aspirate record.

See 15.24.2.1 “Parameters for Aspirate and Dispense records”, 15-41 for details of the parameters.

The **Wash Tip / Replace DITI** record has the following structure:

W; (to use the first wash scheme in the worklist command), or
W1; (to use the first wash scheme in the worklist command), or
W2; (to use the second wash scheme in the worklist command), or
W3; (to use the third wash scheme in the worklist command), or
W4; (to use the fourth wash scheme in the worklist command).

The Wash Tip / Replace DITI record washes the tip (or replaces the DITI) which was used by the preceeding Aspirate record. There are no parameters (the wash position, wash parameters and/or drop DITIs position are specified in the Worklist command).

The **Decontamination Wash** record has the following structure:

WD;

Decontamination wash consists of a decontamination wash operation followed by the normal wash procedure. There are no parameters (the parameters are specified in the Worklist command).

The **Flush** record has the following structure:

F;

It discards the contents of the tips without washing them or dropping DITIs.

The **Break** record forces the execution of previously specified aspirate, dispense or wash actions which have not yet been executed. It has the following structure:

B;

If you don’t specify a Break record, Freedom EVOware normally executes pipetting commands in groups to optimize the efficiency. For example, if you have specified four tips in the Worlist command, Freedom EVOware will queue Aspirate records until four of them are ready for execution. This allows pipetting to take place using all four tips at the same time. Specify the Break record if you want to execute all of the currently queued commands without waiting. You can use the Break record e.g. to create a worklist which pipettes using only one tip at a time (even if you chose more than one tip in the tip selection).

The **Set DITI Type** record has the following structure:

S*;DITI_Index*

When using DITIs, it is used to switch DITI types from within a worklist. Choose the required DITI type by specifying the DiTi index. Freedom EVOware automatically assigns a unique index to each DITI type. The DiTi index is shown in the Edit Labware dialog box for the DITI labware (Well dimensions tab). See 9.4.1 “Editing Labware, Well Dimensions Tab”, 9-19.

The worklist normally uses the DITI type which you select with the *Get DITI* button in the Worklist command.

The **Set DITI Type** record can only be used at the very beginning of the worklist or directly after a **Break** record. A **Break** record always resets the DITI type to the type selected in the Worklist command. Accordingy, if your worklist contains a **Break** record, you may need to specify the **Set DITI Type** record again.

The **Comment** record (ignored by Freedom EVOware) has the following structure:

C;*Comment*

The **Reagent Distribution** record has the following structure:

R;*AspirateParameters;DispenseParameters;Volume;LiquidClass;NoOfDitiReuses;NoOfMultiDisp;Direction[;ExcludeDestWell]**

where:

AspirateParameters =

SrcRackLabel;SrcRackID;SrcRackType;SrcPosStart;SrcPosEnd;

and

DispenseParameters =

DestRackLabel;DestRackID;DestRackType;DestPosStart;DestPosEnd;

See 15.24.2.2 “Parameters for Reagent Distribution records”, 15-42 for details of the parameters.

The Reagent Distribution record specifies the aspiration and dispensing parameters for all of the tips you have chosen (and dispenses the same volume in all of the chosen wells in the destination labware).

The Reagent Distribution record has the following advantages when compared to separate Aspirate and Dispense records:

- Pipetting is automatically optimized during script runtime for the number of tips which are actually fitted to the LiHa.
- Pipetting is automatically adapted to special LiHa configurations such as the 8 Plus 1 Access option of the Freedom EVO 75 pipetting instrument - it is not necessary to create a custom, LiHa-specific worklist.
- Worklists are shorter and easier to set up manually using an editor - less risk of programming errors.

For some examples, see 15.24.6 “Worklist Examples for the Reagent Distribution Record”, 15-45.

15.24.2.1 Parameters for Aspirate and Dispense records

The parameters for Aspirate and Dispense records are as follows:

Tab. 15-1 *Parameters for Aspirate and Dispense records in a worklist file*

Parameter	Range	Explanation
RackLabel	Max. 32 characters	User-defined label (name) which is assigned to the labware.
RackID	Max. 32 characters	Labware barcode.
RackType	Max. 32 characters	Labware type (configuration name), e.g. “384 Well, landscape”.
Position	1 .. number of wells	Well position in the labware. The position starts with 1 and increases from rear to front and left to right.
TubeID	Max. 32 characters	Tube barcode.
Volume	0 .. +7158278	Pipetting volume in µl.

Tab. 15-1 Parameters for Aspirate and Dispense records in a worklist file (cont.)

Parameter	Range	Explanation
LiquidClass	Max. 32 characters	This optional parameter overwrites the liquid class specified in the Worklist command.
TipType		Reserved, must be omitted.
TipMask	1 .. 128	This optional parameter specifies the tip you want to use. The tip number is bit-coded, i.e. Tip 1 = 1, Tip 2 = 2, Tip 3 = 4; Tip 4 = 8 and so on. Please note that you can only use a tip which has been enabled with Tip Selection in the Worklist command. If you do not specify TipMask, Freedom EVOware uses one of the tips specified with Tip Selection in the Worklist command.
ForcedRack-Type	Max. 32 characters	This optional parameter is the configuration name of the labware. If specified, it is used instead of the labware type which is found on the Freedom EVOware worktable.
MinDetected-Volume	0 .. +7158278	Liquid volume in µl. If this optional parameter is specified and Liquid Level Detection is enabled in the selected liquid class, it is used by the LiHa to determine the minimum liquid height which must be available in the well. Otherwise a liquid detection error (not enough liquid) will be triggered. MinDetectedVolume specifies the *usable volume* of liquid. If the aspiration position in the liquid class specifies tip immersion (tip submerging), the actual liquid height in the well must be higher to allow immersion (i.e. the volume of liquid in the well must be more than MinDetectedVolume).

15.24.2.2 Parameters for Reagent Distribution records

The aspirate parameters for Reagent Distribution records are as follows:

Tab. 15-2 Aspirate Parameters for the Reagent Distribution command

Parameter	Range	Explanation
SrcRackLa-bel	Max. 32 characters	User-defined label (name) which is assigned to the source labware.
SrcRackID	Max. 32 characters	Source labware barcode.
SrcRackType	Max. 32 characters	Source labware type (configuration name), e.g. “384 Well, landscape”.
SrcPosStart	1 .. number of wells	First well to be used in the source labware.
SrcPosEnd	1 .. number of wells	Last well to be used in the source labware.

The dispense parameters for Reagent Distribution records are as follows:

Tab. 15-3 *Dispense Parameters for the Reagent Distribution command*

Parameter	Range	Explanation
DestRackLabel	Max. 32 characters	User-defined label (name) which is assigned to the destination labware.
DestRackID	Max. 32 characters	Destination labware barcode.
DestRackType	Max. 32 characters	Destination labware type (configuration name), e.g. “384 Well, landscape”.
DestPosStart	1 .. number of wells	First well to be used in the destination labware.
DestPosEnd	1 .. number of wells	Last well to be used in the destination labware.

The following parameters must also be specified for for Reagent Distribution records:

Tab. 15-4 *Additional Parameters for the Reagent Distribution command*

Parameter	Range	Explanation
Volume	0 .. +7158278	Dispense volume in the destination labware in µl.
LiquidClass	Max. 32 characters	This optional parameter overwrites the liquid class specified in the Worklist command.
NoOfDitiReuses	-	Optional maximum number of DiTi reuses allowed (default 1 = no DiTi reuse).
NoOfMultiDisp	-	Optional maximum number of dispenses in a multi-dispense sequence (default 1 = no multi-dispense).
Direction	-	Optional pipetting direction (0 = left to right, 1 = right to left; default = 0).
[ExcludeDestWell]*]		Optional list of wells in destination labware to be excluded from pipetting

The following sections describe how to create files for three different types of worklist with Aspirate and Dispense records.

15.24.3 Worklist Examples Using Labware Labels

Use this worklist format if you want to use labware labels to specify source and/or destination positions in the worklist. This is necessary if your instrument does not have a PosID barcode scanner or your labware does not carry barcodes.

In this case, you only need to define the following parameters in an Aspirate or Dispense record:

A;RackLabel;;RackType;Position;;Volume
D;RackLabel;;RackType;Position;;Volume

Parameter *RackType* is optional. If specified, Freedom EVOware checks whether the labware specified with *RackLabel* has the configuration name specified with *RackType*. An error message is displayed if an incorrect labware type is found on the Freedom EVOware worktable.

Parameter *ForcedRackType* is optional. If specified, Freedom EVOware does not use the labware type of the labware specified with *RackLabel*, but uses ForcedRackType instead. The following worklist example illustrates the use of *ForcedRackType* in an Aspirate and a Dispense command:

A;S1;;;9;;10;;;;Microplate, landscape
D;D1;;;1;;10;;;;Deepwell, landscape

If you specify the *ForcedRackType* parameter, you must make sure that labware of the required types have been placed in the right positions on the instrument's worktable before the worklist is executed.

The system liquid is associated with a "virtual" labware item of type *System* and labware label *Systemliquid*. The following worklist command can be used to aspirate the system liquid:

A;Systemliquid;;System;1;;500:Water

The following worklist example aspirates 10.1 µl from well A2 in labware "S1", dispenses 6 µl into well A1 in labware "D1", dispenses 4 µl into well B1 in labware "D1" and then washes the tip / changes the DITI:

A;S1;;Microplate, landscape;9;;10.1
D;D1;;Microplate, landscape;1;;6
D;D1;;Microplate, landscape;2;;4
W;

Note that Freedom EVOware counts wells from rear to front and then from left to right and a *Microplate, landscape* labware has eight wells in each column. Accordingly, well A2 is specified in the above worklist as "9".

15.24.4 Worklist Examples Using Labware Barcodes

Use this worklist format if you want to use labware barcodes to specify source and/or destination positions in the worklist. To use this worklist format, your instrument must be equipped with a PosID option and you must scan the labware (with a PosID command) in advance of the Execute Worklist command.

In this case, you only need to define the following parameters in an Aspirate or Dispense record:

A;;RackID;RackType;Position;;Volume
A;;RackID;RackType;Position;;Volume

The following worklist example aspirates 10 µl from well H12 in the labware with barcode "1234", dispenses 10 µl into well A12 into the labware with barcode "5678" and then washes the tip / changes the DITI:

A;;1234;Microplate, landscape;96;;10
D;;5678;Microplate, landscape;89;;10
W;

Freedom EVOware Plus

If you use labware barcodes to specify source and/or destination positions in the worklist, do not use a labware repository on the worktable if the labware will be moved during runtime to another worktable position for pipetting. This will lead to pipetting at the wrong worktable position. Use a labware repository in a feeder device (e.g. hotel or carousel) instead. See 11.6 "Labware Generator (Freedom EVOware Plus)", 11-16.

15.24.5 Worklist Examples Using Tube Barcodes

Use this worklist format if you want to use tube barcodes to specify source and/or destination positions in the worklist. To use this worklist format, your instrument must be equipped with a PosID option and you must scan the labware (with a PosID command) in advance of the Execute Worklist command.

In this case, you only need to define the following parameters in an Aspirate or Dispense record:

A;;;RackType;;TubeID;Volume
A;;;RackType;;TubeID;Volume

The following worklist example aspirates 10 µl from the tube with barcode “S0001”, dispenses 10 µl into the tube with barcode “D0002” and then washes the tip / changes the DITI:

A;;;Tube 10*100mm, 16 Pos.;;S0001;10
D;;;Tube 16*100mm, 16 Pos.;;D0002;10
W;

Freedom EVOware Plus

If you use tube barcodes to specify source and/or destination positions in the worklist, do not use a labware repository on the worktable if the tube rack will be moved during runtime to another worktable position for pipetting. This will lead to pipetting at the wrong worktable position. Use a labware repository in a feeder device (e.g. hotel or carousel) instead. See 11.6 “Labware Generator (Freedom EVOware Plus)”, 11-16.

15.24.6 Worklist Examples for the Reagent Distribution Record

The worklist example below is configured as follows:

- Source labware: Trough 100ml, labeled 'T3', use wells 1 - 8
- Destination labware: 96 Well Microplate, labeled 'MTP96-3', use wells 1 - 96
- Liquid class 'Water'
- DiTi Reuse = 1 (use only once), Multi-dispense = max. 6
- Pipetting direction 0 = left to right
- Exclude wells 27, 46, 51, 69, 82 => Well positions (column,well) 4,3 / 6,6 / 7,3 / 9,5 / 11,2

R;T3;;Trough 100ml;1;8;MTP96-3;;96 Well Microplate;1;96;100;Water;
1;6;0;27;46;51;69;82

The worklist example below is configured as follows:

- Source labware: Trough 100ml, labeled 'T2', use wells 1 - 8
- Destination labware: 96 Well Microplate, labeled 'MTP96-2', use wells 1 - 96
- Liquid class 'Water'
- DiTi Reuse = 2 (use 2 times), Multi-dispense = max. 5
- Pipetting direction 0 = left to right
- No wells to be excluded

R;T2;;Trough 100ml;1;8;MTP96-2;;96 Well Microplate;1;96;100;Water;
2;5;0

15.24.7 Advanced Worklists

Freedom EVOware also allows you to use most of the script commands (such as Wash Tips) and device commands (such as Carousel - ReturnPlate) in a worklist. This is done using so-called advanced worklist commands. See A.15 “Advanced Worklist Commands”, A-118 for information on the commands and the command syntax. Advanced worklist commands are only supported for research applications.

15.25 Worklist Import Command

The Worklist Import command is used to create a Freedom EVOware worklist from an Excel file which is stored in CSV format. See 15.24 “Worklist Command”, 15-36 for more information on worklists.

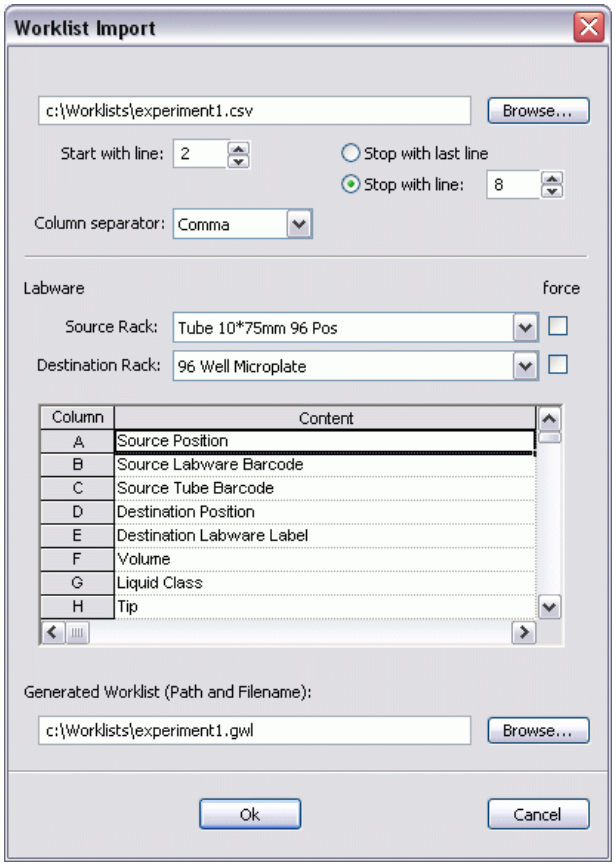


***Fig. 15-26** Worklist Import command*

The parameters of the Worklist Import command are as follows:

Import Worklist (Path and Name)

Specify the file name and location of the CSV file to import. Enter the path and file name directly or click Browse and choose an existing file.

Column Separator

Choose the separator which is used between the fields (columns) in each of the records (i.e. lines) of the import file. The default is Comma.

Start with line

Conversion normally starts with the first line of the import file. Specify a line number which is higher than 1 to skip one or more lines at the beginning of the file.

Stop with last line

Stop conversion with the last line of the import file.

Stop with line

Conversion normally stops with the last line of the import file. Specify the line number where you want the conversion to stop. The remaining lines in the import file are skipped.

Source Labware

Choose the source labware type for which the generated worklist will be used.
Force: Check this checkbox to create a worklist for the chosen source labware type instead of the labware type which is found on the Freedom EVOware worktable. This is done by including the ForcedRackType parameter in the A and D records of the worklist (see 15.24.2 “Worklist File Format”, 15-39).

Destination Labware

Choose the destination labware type for which the generated worklist will be used.
Force: Check this checkbox to create a worklist for the chosen destination labware type instead of the labware type which is found on the Freedom EVOware worktable. This is done by including the ForcedRackType parameter in the A and D records of the worklist (see 15.24.2 “Worklist File Format”, 15-39).

Content

The Worklist Import command can handle up to 11 different input parameters in the import file (labware name, labware barcode, tube barcode, worktable position for both source and destination carrier; volume, liquid class, and tip). For each column (field) of the import file, specify the assignment to one of the 11 parameters by choosing from the drop-down list. Alternatively, leave the Content field empty to skip the field because it is empty or contains irrelevant data. An error message is output if you assign the same parameter to more than one column of the input file or make a meaningless or contradictory assignment.

Generated Worklist (Path and Filename)

Specify the file name and location of the worklist file (*.gwl) which should be created. Enter the path and file name directly or click Browse and choose an existing worklist file. The Import Worklist command overwrites the previous contents of the file each time it is executed.

OK

Click *OK* to insert the Worklist Import command in your script.

Cancel

Click *Cancel* to close the dialog box without inserting the command.

Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors and shows all commands which have errors in red. The Worklist Import command creates the worklist file when you run the script or process. However, the worklist file does not exist yet when validation takes place. Accordingly, Freedom EVOware will

indicate an error in the Worklist command which is to receive the worklist file (Error opening worklist file). To avoid the validation error, we recommend you to create an empty (dummy) worklist file using an editor such as Notepad.

15.26 Export Data Command

The Export Data command is used to create report files for selected labware or for all labware on the worktable or the Te-MO deck. The report files contain information about the pipetting which has been carried out. The report files are written to the Output directory which is specified in Freedom EVOware's Configuration Tool (see 8.3.1.4 "Protocol Options Tab", 8-8). The default Output directory is <install_path>\Output.

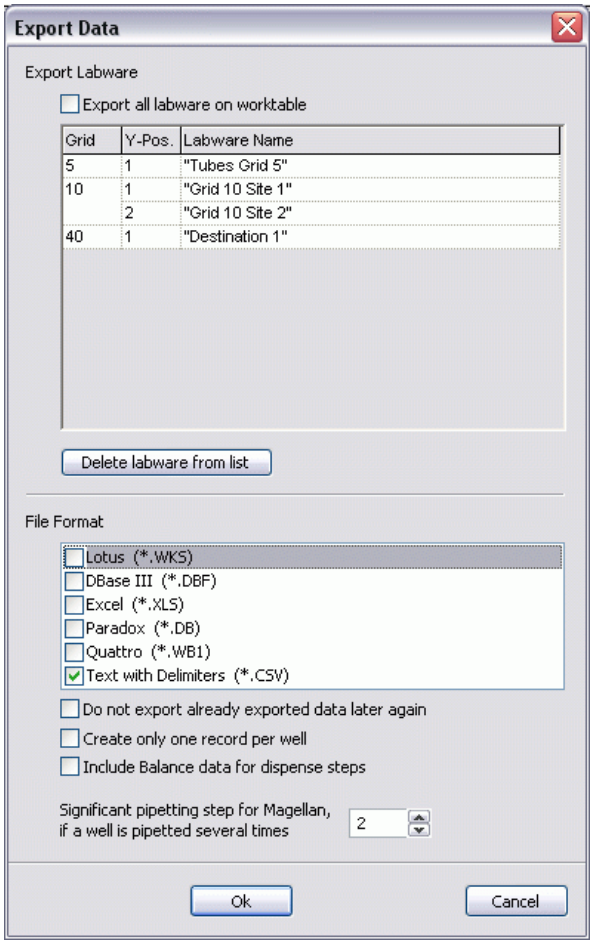


Fig. 15-27 *Export Data command*

The parameters of the Export Data command are as follows:

Labware to be exported

This panel shows the labware for which Freedom EVOware will create output files. A separate report file is created for each labware (see 15.26.1 “File Names for Labware Report Files”, 15-50). Add labware to the list by clicking on the labware in the Worktable Editor. To remove an entry, select the line in the list and click *Delete labware from list*.

Check the *Export all labware on worktable* checkbox to creates reports for all labware on the worktable. In this case, the list of labware you have specified is ignored.

File Formats

This panel is used to select one or more file formats for the report. Freedom EVOware creates the file(s) in the directory you have specified in Setup > Settings > Output.

Significant pipetting step for Magellan ...

If you plan to use a Tecan Microplate Reader (photometer) in your script or process, specify which pipetting step is relevant to the Magellan data reduction software if the same well will be pipetted several times. For example, if you pipette the sample and then pipette a reagent, Magellan needs to know which step pipettes the sample. Information on the significant pipetting step will be included in the labware report file which the Export Data command creates for the Magellan software. See 16.16.6 “Magellan - Measure Command”, 16-49 for further information.

Do not export already exported data later again

If you use the Export Data command more than once in the same script, check this option if you don’t want to export pipetting data again which has already been exported. This setting deletes the internal pipetting records for all prior pipetting operations, not only for the labware specified in the Export Data command.

Create only one record per well

Freedom EVOware normally outputs one record for each Aspirate or Dispense command for each well. If you check this checkbox, Freedom EVOware only writes one record for each well. The record will then contain information on the accumulated errors (bitwise addition of all error codes), the accumulated total pipetting volume (the sum of dispense volumes, i.e. positive values and aspirate volumes, i.e. negative values) and the maximum detected volume.

Include balance data for dispense steps

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. Check this checkbox if you want to include the weight measurements in the report file. In this case, the report file will include four extra columns if a Liquid Arrival Check was carried out when dispensing. See 15.26.4 “Pooling balance data in report files”, 15-56 for more information.

Export Data and Transfer Labware commands

If your script uses the Transfer Labware or Transfer Tube command to move labware which you have specified in the Export Data command, the Export Data command must be used before the labware is moved. Otherwise, positional information in the report file may be misleading or incorrect.

If your script uses the Transfer Labware or Transfer Tube command to move labware which you have specified in the Export Data command and you want to use the Export Data command again in the same script, you must check the Do

not export already exported data later again checkboxes in the Export Data commands. Otherwise, the positional information in the report files may be misleading or incorrect.

15.26.1 File Names for Labware Report Files

The file names for the labware report files are created automatically and contain the labware barcodes as follows:

labware barcode + extension for selected file format (e.g. 9900001.xls)

The file name for a tube rack report file (e.g. Tube 13*75mm, 16 Pos.) is:

tube rack barcode + extension for selected file format (e.g. 013_000064.xls)

Slash "/" characters in tube rack barcodes are replaced in file names by underscore "_". The barcodes are also reported in the *SRCRackID* field of each labware report file.

If a labware or tube rack barcode was not scanned in advance of the Export Data command, the labware label is used to create the file name instead, for example:

labware label + extension for selected file format (e.g. MyLabware1.xls)

Labware labels are unique within the same worktable layout. See also 15.26.2 "Simulated Barcodes for the Export Data Command", 🗎 15-50.

15.26.2 Simulated Barcodes for the Export Data Command

If a labware or tube rack barcode was not scanned in advance of the Export Data command, the labware label is used for the barcode instead ("simulated barcode"). Labware labels are unique within the same worktable layout.

Missing tube barcodes are not simulated; they are left blank in the report file.

15.26.3 Report File Format

The following is an example of an output file in Excel format (example file name 9900001.xls).

Depending on the version and configuration of your instrument, some of the fields may not be applicable and will be left blank, but – to preserve the file structure – the fields will not be omitted completely. Fields which are intended for labware barcodes contain simulated barcodes if the barcode was not scanned (see 15.26.2 "Simulated Barcodes for the Export Data Command", 🗎 15-50). Fields which are intended for tube barcodes contain three stars (***) if the barcode could not be read.

If you checked *Include balance data for dispense steps* in the Export Data command and a Liquid Arrival Check was carried out when dispensing, the report file includes four additional columns for the pooling balance data. These four columns are described in 15.26.4 "Pooling balance data in report files", 🗎 15-56 but are not shown in the following table due to lack of space:

Tab. 15-5 *Sample Excel file produced with the Export Data command*

Pos.	Tube ID	Scan Error	SRCRack	SRC Pos	SRC Tube ID	Volume	Error	SRCRackID	Grid Pos	SiteOnGrid	Tip Number	Detect Vol	Time
	Version 1.20	3091	96 Well Microplate	12	8	1	0	9900001	18	2	FB28		3.8.2005
1		0	Tube 13*85mm	1	0001	10	0	013_000064	4	1	1		11:55:42
3		0	Tube 13*85mm	2	0002	20	0	013_000064	4	1	2		11:55:42
5		0	Tube 13*85mm	3	0003	30	0	013_000064	4	1	3		11:55:42
7		0	Tube 13*85mm	4	0004	40	0	013_000064	4	1	4		11:55:42

In the example, liquid was pipetted from four tubes into a microplate.

The first line contains the column headers, which are the same for all file formats (except that some file formats only support upper-case characters for column headers).

The second line contains information on the labware or tube rack for which the report was created and the date that the report was created. The second line also contains information which is relevant to the Magellan (data reduction) option.

The third and subsequent lines contain information on the wells in the labware or the tubes in the tube rack. Dispense commands are indicated by a positive value in the volume column and aspirate commands are indicated by a negative value.

The columns contain the following information:

Tab. 15-6 *Parameters in the report file output by the Export Data command*

Column	Range	Explanation
Position	1 .. number of wells	Destination well number or tube number. The numbering sequence is rear to front and then left to right.
TubeID	Max. 32 characters	Barcode of destination tube. This column is only used if the destination is a tube rack (i.e. you are pipetting into tubes). In line 2, this column shows the Freedom EVOware software version.
ScanError	0 .. 4294967295	This column shows barcode scanning errors (if any) at the destination. See Tab. 15-7, 🗎 15-54, below. In line 2, this column shows the serial number of pipetting instrument. If you chose to include pooling balance data in the report file and a Liquid Arrival Check was carried out when dispensing, the serial number of the balance is also included in line 2 (see 15.26.4 “Pooling balance data in report files”, 🗎 15-56). The two serial numbers are separated by “/”.
SRCRack	Max. 32 characters	For dispense commands, this column shows the configuration name of the source labware. In line 2, this column shows the configuration name of the labware for which the report file was created (the configuration name of the destination labware).
SRCPos	1 .. number of wells	For dispense commands, this column shows the position in the source labware where the liquid came from. In line 2, this column shows the total number of wells in the labware in the x direction.
SRCTubeID	Max. 32 characters	If the source for a dispense command was a tube rack, this column shows the barcode of the source tube. In line 2, this column shows the total number of wells in the labware in the y direction.
Volume	-7158278 .. +7158278	This column contains the volume in µl which was dispensed (positive value) or aspirated (negative value). dest In line 2, this column shows which pipetting step is relevant to the Tecan Magellan software if more than one has been carried out on the same well; see “Significant pipetting step for Magellan ...”, 🗎 15-49 for further information.

Tab. 15-6 Parameters in the report file output by the Export Data command (cont.)

Column	Range	Explanation
Error	0 .. 4294967295	This column shows pipetting errors (if any). See Tab. 15-8, 15-54, below. In line 2, this column shows scanning errors for the labware for which the report file was created.
SRCRackID	max. 32 characters	For dispense commands, this column shows the barcode of the source labware. If the source for the dispense command was a tube rack, this column shows the barcode of the source tube rack. In line 2, this column shows the barcode of the labware for which the report file was created. For labware on the Te-MO, it shows the simulated barcode (see 15.26.1 “File Names for Labware Report Files”, 15-50).
GridPos	1 .. 67	For dispense commands, this column shows the grid position of the source labware. In line 2, this column shows the grid position of the labware for which the report file was created.
SiteOnGrid	1 .. 128	For dispense commands, this column shows the carrier site of the source labware. It is always 1 when dispensing from tube racks (because they only have one site). In line 2, this column shows the carrier site of the labware for which the report file was created. It is always 1 when dispensing into tube racks (because they only have one site).
TipNumber	1 .. 8	This column shows the tip number which was used for pipetting into / from this well. In line 2, this column contains the 4-character checksum for the file. This is used to check whether the file is corrupted or has been modified outside of Freedom EVOware (see A.9.1 “Data Explorer Tool”, A-35).
DetectVol	0 .. +7158278	If liquid level detection was used, this column shows the detected volume in the well before the aspirate / dispense command.
Time		This is the time (hh:mm:ss) when the pipetting was carried out on the well. In line 2, this column shows the date that the report was created.

The following table shows possible codes in the ScanError column. The value is bit-coded. If several errors occurred, the value shown is the bit-wise addition of

the separate error codes. The Te-MO does not have a barcode scanner and does not generate barcode scanning errors.

Tab. 15-7 *Barcode scanning error codes in the report file output by the Export Data command*

Code (decimal)	Code (hex)	Caused by	Explanation
0	0	-	No error.
16	10	Instrument	A barcode could not be read by the PosID or the PosID-3 scanner.
32	20	Instrument	The same labware was scanned again (at the same grid position or at a new worktable position of the same labware) and the scanned barcode did not match the previously scanned barcode. If this error occurs, Freedom EVOware updates the stored information for the labware with the newer barcode.
64	40	Instrument	An identical barcode was scanned at an unexpected grid position. Either (a) two labware items have identical barcodes or (b) the labware was moved to a different grid position manually. If this error occurs, Freedom EVOware assumes that (b) has taken place and updates the stored information for the labware with the new position.
4096	1000	User	The user entered the barcode manually after a scanning error.
8192	2000	User	The user chose *Retry* after a barcode scanning error.
16384	4000	User	The user chose *Ignore* after a barcode scanning error.

The following table shows possible codes in the Error column. The value is bit-coded. If several errors occurred, the value shown is the bit-wise addition of the separate error codes.

Tab. 15-8 *Pipetting error codes in the report file output by the Export Data command*

Code (decimal)	Code (hex)	Caused by	Explanation
0	0	-	No error.
1	1	Instrument	No liquid was detected.
2	2	Instrument	Not enough liquid was detected.
4	4	Instrument	Clot was detected.
8	8	Instrument	A dilutor error occurred during pipetting.

Tab. 15-8 Pipetting error codes in the report file output by the Export Data command (cont.)

Code (decimal)	Code (hex)	Caused by	Explanation
256	100	Instrument	Liquid Arrival Check, liquid error: The dispensed volume was outside of the tolerance specified in the liquid class. This error is generated by the LAC (pooling balance) feature (see 15.26.4 “Pooling balance data in report files”, 15-56).
512	200	Instrument	Liquid Arrival Check, technical error: timeout or hardware malfunction such as balance overload. This error is generated by the LAC (pooling balance) feature.
1,024	400	Instrument	The PMP option detected a tip orifice occlusion (e.g. clot aspirated). This error also results in error code 4 (clot detected).
2,048	800	Instrument	The PMP option detected an incorrect pipetting volume.
65,536	10000	User	The dilutor was initialized after a dilutor error.
131,072	20000	User	The dilutor was deactivated after a dilutor error.
262,144	40000	User	The user chose *Retry* after a clot-detection error.
524,288	80000	User	The user chose *Ignore* after a clot-detection error.
1,048,576	100000	User	The user chose *Continue* after a clot-detection error.
2,097,152	200000	User	The user chose *Retry* after a liquid-detection error.
4,194,304	400000	User	The user chose *Aspirate air* after a liquid-detection error.
8,388,608	800000	User	The user chose *Move tips to Z-Max* after a liquid-detection error.
33,554,432	2000000		The PMP option detected an instrument error (e.g. a leakage from the air gap or a blocked pressure channel). a)
67,108,864	4000000		The PMP option detected an unspecified error. If this occurs more than three times in a row for the same tip, this can also indicate an instrument error. a)

a) *In the case of an instrument error, you can use the Setup & Service software (PMP panel) to get more detailed information on the error. The Setup & Service software is provided by Tecan to service engineers. See 17.6.4 “PMP Error and Success Messages”, 17-22 for more information on PMP errors and error handling.*

Note: *If a liquid from a container or tube which returns a barcode error is pipetted to another labware item, the error is inherited in the destination well as a pipetting error (not a barcode error). The value of the error code is unchanged (see Tab. 15-7, 15-54 for a list of the applicable error codes).*

Note: *If “Pipette Nothing” was chosen after a liquid level detection error or clot error, the affected well(s) will not be reported any more in the output files.*

15.26.4 Pooling balance data in report files

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation.

The Liquid Arrival Check is only carried out if the labware is put onto a pooling balance for the dispense operation and LAC is activated for the liquid class which is used. See 10.1.1 “Global Parameters for Liquid Classes”, 10-4, Liquid Arrival Check panel.

If you checked the *Include balance data for dispense steps* checkbox in the Export Data command and a Liquid Arrival Check was carried out, the report file will include the following four additional columns for the pooling balance data:

Tab. 15-9 *Additional columns in the report file for pooling balance data*

Expected Weight	ActualWeight	ActualVolume	SampleDensity
150.00	149.00	135.45	
50.00	52.00	47.27	1.10
25.00	22.00	20.00	1.10
50.00	51.00	46.36	1.10
25.00	24.00	21.81	1.10

The columns contain the following information:

***Tab. 15-10** Parameters in the report file for pooling balance data*

Column	Explanation
Expected Weight	Expected weight difference calculated from the expected volume and the sample density. [a)] Line 2: Total expected weight (sum of all dispense steps).
ActualWeight	Actual weight difference indicated by the pooling balance by measuring before and after the dispense step. Line 2: Total actual weight difference (sum of all dispense steps).
ActualVolume	Actual dispensed volume calculated from the actual weight difference and the sample density. [a)] Line 2: Total actual dispensed volume (sum of all dispense steps).
SampleDensity	Density of the dispensed liquid. [a)] Line 2: Empty.

a) As specified in the liquid liquid class used for the dispense step.

15.27 Manual Tip Alignment Command

This command is used to check the alignment of the Liquid Handling Arm (LiHa) before or after running a pipetting script. It is also able to detect bent tips. It is only intended for the LiHa of the Freedom EVO pipetting instrument and is normally only necessary if you are using microplates with 1536 wells or other high precision labware. This command is mainly intended for use in maintenance scripts (see 6.4.2 “Run Maintenance”, 🗎 6-10). Please note that this function is a quick test and delivers less precise results than the *Setup & Service* software.

Use the Tip Alignment Check command instead if you need to check tip alignment when a pipetting script is running (see 15.20 “Tip Alignment Check Command”, 🗎 15-30).

Racks with 1536 wells have a very high packing density and the wells have a diameter of only 1.7 mm. The high precision requires a special LiHa design. In addition, 1536-well racks need to be placed on a specially designed carrier. The special carrier and the high-precision LiHa are key components of the Tecan Positioning System (Te-PS).

Arm alignment is done using the Te-PS Sensor plate, which is placed on the Te-PS Carrier. The tip alignment process moves each of the pipetting tips past the sensor plate, and lasers are used to accurately measure the position.

Tip alignment can also be tested while running a script (see 15.20 “Tip Alignment Check Command”, 🗎 15-30).

To carry out the test, place the Te-PS Sensor plate on one of the sites of the Te-PS Carrier. Check that the sensor plate is properly connected to the pipetting instrument using the supplied cable.

In addition, you must put the Te-PS Sensor plate at the same grid and site position in the Worktable Editor.

If necessary, the *Manual Tip Alignment* function can also be used to check the tip alignment with other carrier and rack types. The test should then be carried out

with the Te-PS Sensor plate placed on the same carrier which will be used for pipetting. However, due to the mechanical design and other factors, the Te-PS Carrier can achieve a higher alignment accuracy than conventional carrier types.

The following dialog box is shown when you insert the Manual Tip Alignment command in your script:

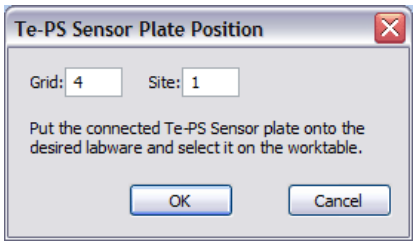

Te-PS Sensor Plate Position
Grid: 4
Site: 1
Put the connected Te-PS Sensor plate onto the desired labware and select it on the worktable.
OK
Cancel

Fig. 15-28 *Sensorplate Position dialog box*

Click on the Te-PS Sensor plate in the Worktable Editor or specify the grid and site position manually and click OK to start the tip alignment procedure.

A dialog box (not shown) warns you that the LiHa will now move to the sensor plate position. If your instrument is fitted with doorlocks, for safety reasons the doorlocks will be locked before moving the LiHa. Click OK to continue to the Tip Alignment Results dialog box or click Cancel to cancel tip alignment.

15.27.1 Tip Alignment Results

This dialog box is used by the Manual Tip Alignment function to display the misalignment (if any) of the Liquid Handling Arm (LiHa):

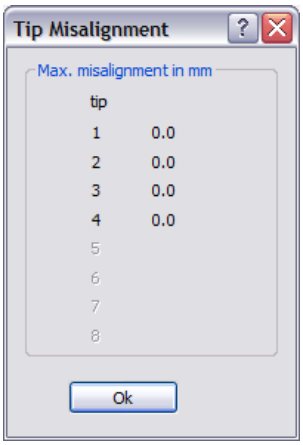


Fig. 15-29 *Tip Alignment Results dialog box*

Click *OK* to start the test. After the test is finished, the dialog box shows the misalignment in mm for each of the tips.

If the misalignment exceeds the maximum allowed value for any of the tips, the instrument must be re-calibrated by authorized personnel using the *Setup & Service* software (see 1.2 “Reference Documents”, 1-3 for information on this software).

The maximum allowed misalignment depends on the radius and shape of the wells in the racks that you are using. It should be less than *well radius - tip radius*.

For 1536-well racks, an appropriate value for the maximum misalignment is 0.5 mm.

After completing the test, you can remove the sensor plate from the carrier if the site is required by a subsequent pipetting script. However, you should not unplug the sensor plate cable from the pipetting instrument.

15.28 Copy Plate Wizard

The Copy Plate wizard creates a set of script commands which make identical copies of the source plate on one or more destination plates. You can copy the whole plate or a rectangular selection of wells.

After you have completed all of the steps in the wizard, it creates script commands which carry out the required actions and inserts them in the Script Editor window at the currently selected position. If necessary, the script commands can then be edited if you want to include some special features.

15.28.1 Copy Plate Wizard, Step 1 of 4

Select the source plate parameters:

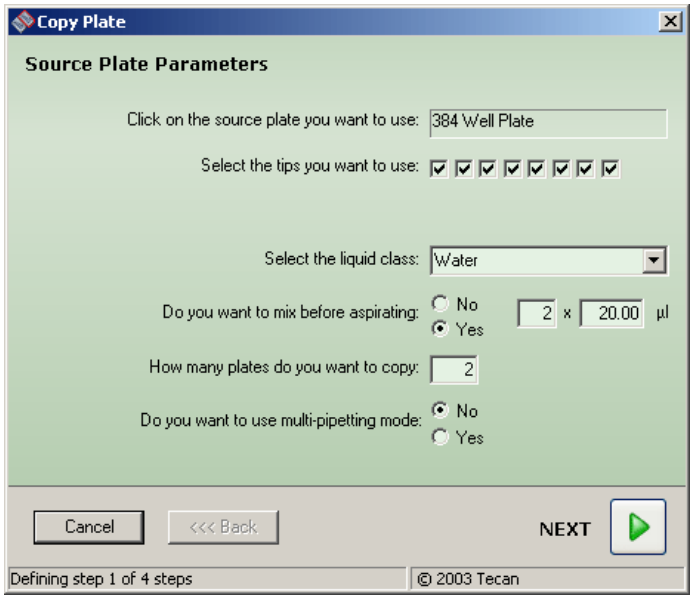


Fig. 15-30 *Copy Plate wizard, step 1 of 4*

Click on the source plate you want to use

Select the source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Select the tips you want to use

Check the appropriate checkboxes.

Note: *The Copy Plate wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).*

Click on the DITI rack you want to use

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Select the liquid class

Choose the required liquid class for the source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also 10 “Configuring Liquid Classes”, 10-1.

Do you want to mix before aspirating

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

How many plates do you want to copy

Select the number of copies you want to make from the source labware. The allowed range is from 1 to 16.

Do you want to use multi-pipetting mode

This option only appears if you have chosen to make more than one copy. With multi-pipetting mode, the liquid which is aspirated is dispensed in portions into several destination positions. With single pipetting mode, the liquid which is aspirated is dispensed into a single destination position in one step.

15.28.2 Copy Plate Wizard, Step 2 of 4

Select the destination plate parameters:

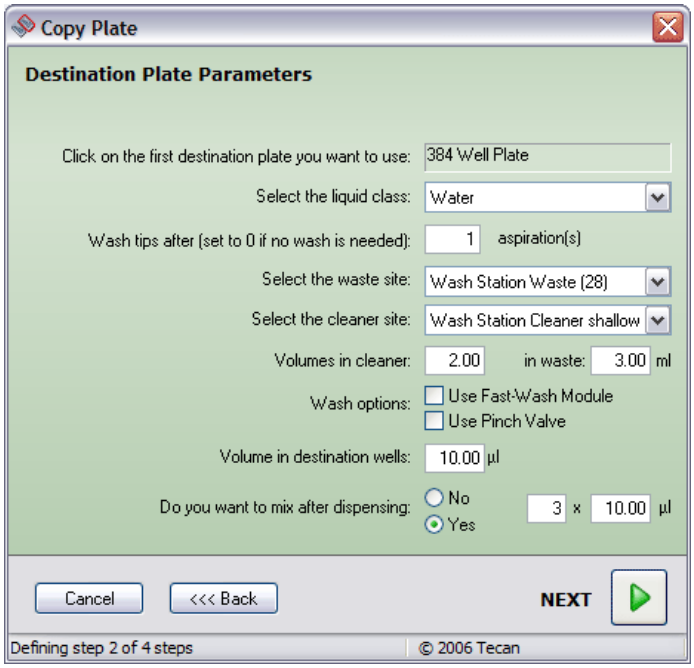


Fig. 15-31 *Copy Plate wizard, step 2 of 4*

Click on the first destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

If you have chosen to make more than one copy, Freedom EVOware will choose additional labware of the same type automatically by searching the worktable from rear to front and then from left to right (you cannot select it yourself). Make sure there is enough labware on the worktable for all of the copies and choose the left-most and top-most plate for the first copy. Otherwise the script which is created will contain errors (faulty script lines are marked in red).

Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Wash tips after x aspiration(s)

This option only appears if you are using fixed tips. Enter a non-zero value if you want to wash the tips after aspirating. If you specify “1”, washing will be carried out after each aspiration.

Change DiTis after x aspirations

This option only appears if you are using DITIs (disposable tips). Enter a non-zero value if you want to replace the DITIs after aspirating. If you specify “1”, the DITIs will be replaced after each aspiration.

The following settings for the waste and the cleaner do not appear if you have chosen “0” (i.e. “wash is not necessary” or “DITI change is not necessary”).

Select the waste site

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor. Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.

When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also 15.5 “Periodic Wash Command”, 15-10.

Select the cleaner site

This option only appears if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

Volumes in cleaner and in waste

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see 15.4 “Wash Tips Command”, 15-8.

Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

Volume in destination wells

Specify the required volume of liquid in the destination wells (the same volume will be dispensed to all wells of all copies). Freedom EVOware automatically calculates the necessary aspiration volume for the source labware. However, Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity.

Do you want to mix after dispensing

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

15.28.3 Copy Plate Wizard, Step 3 of 4

Select the source wells to be copied:

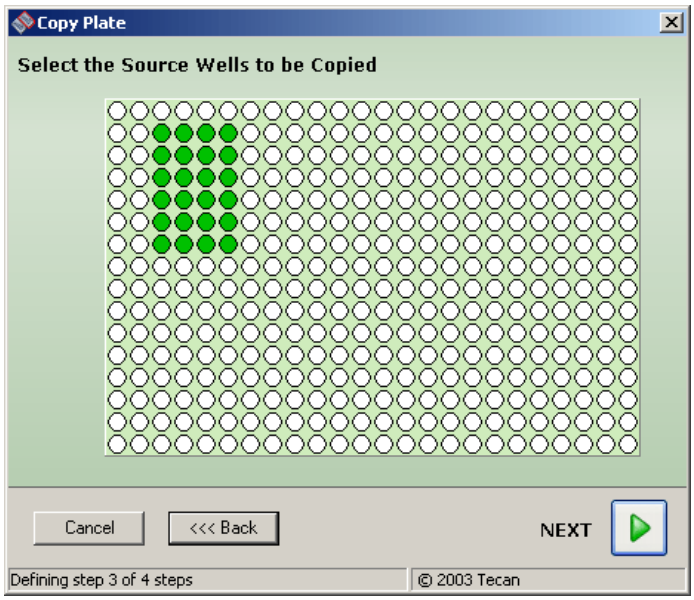


Fig. 15-32 *Copy Plate wizard, step 3 of 4*

Select the source wells to be copied

Select one or more rows and columns of wells by clicking with the mouse and dragging. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware.

15.28.4 Copy Plate Wizard, Step 4 of 4

Select the start position (top left) of the destination wells:

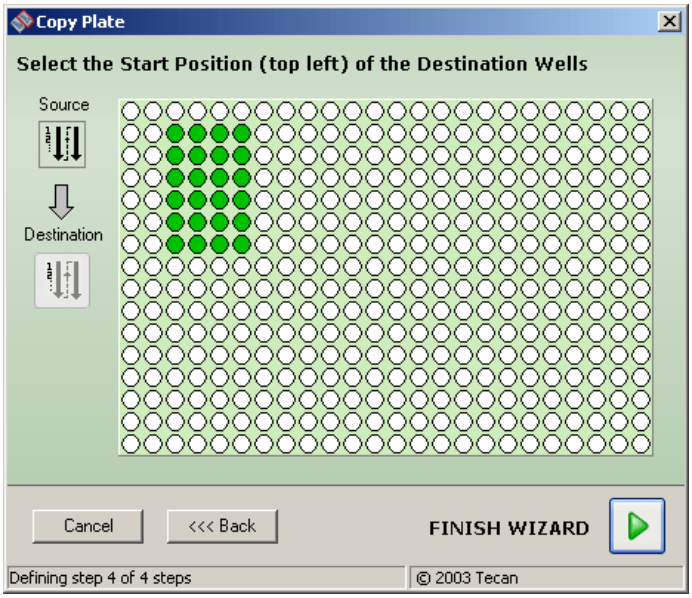


Fig. 15-33 *Copy Plate wizard, step 4 of 4*

Select the start position (top left) of the destination wells

Select the required position of the destination wells by clicking with the mouse. The same selection of wells will be used for all destination plates. An error message will be displayed if the position you choose does not allow all of the source wells to fit on the destination plate (to avoid this, choose a start position towards the top left of the plate).

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

Note: *Click the "-" button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The "-" button changes to "+". Click the "+" button to show the script lines again.*

15.29 Replicates Wizard

The Replicates wizard creates a set of script commands which make one or more repetitions (copies) of selected wells on the source plate on one or more destination plates. All of the destination plates will be identical. You can only create horizontal replicates.

After you have completed all of the steps in the wizard, it creates script commands which carry out the required actions and inserts them in the Script Editor window at the currently selected position. If necessary, the script commands can then be edited if you want to include some special features.

15.29.1 Replicates Wizard, Step 1 of 5

Select the source plate parameters:

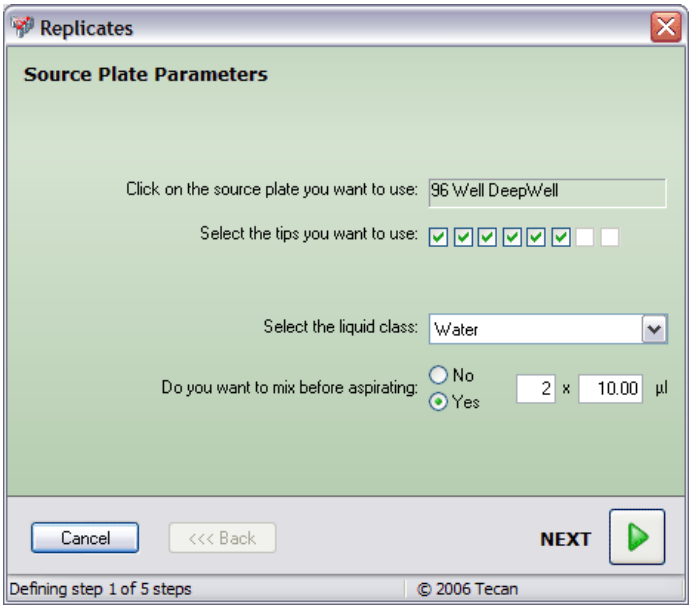


Fig. 15-34 *Replicates wizard, step 1 of 5*

Click on the source plate you want to use

Select the source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Select the tips you want to use

Check the appropriate checkboxes.

Note: *The Replicates wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).*

Click on the DITI rack you want to use

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Select the liquid class

Choose the required liquid class for the source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also 10 “Configuring Liquid Classes”, 10-1.

Do you want to mix before aspirating

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

15.29.2 Replicates Wizard, Step 2 of 5

Select the destination plate parameters:

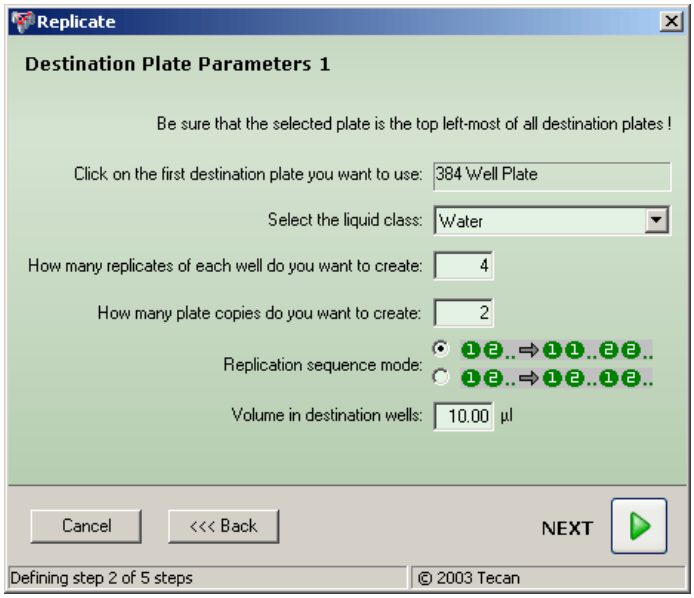

Replicate
Destination Plate Parameters 1
Be sure that the selected plate is the top left-most of all destination plates !
Click on the first destination plate you want to use:
384 Well Plate
Select the liquid class:
Water
How many replicates of each well do you want to create:
4
How many plate copies do you want to create:
2
Replication sequence mode:
Volume in destination wells:
10.00 µl
Cancel
<<< Back
NEXT
Defining step 2 of 5 steps
© 2003 Tecan

Fig. 15-35 *Replicates wizard, step 2 of 5*

Click on the first destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

If you have chosen to make more than one replicate, Freedom EVOware will choose additional labware of the same type automatically by searching the worktable from rear to front and then from left to right (you cannot select it yourself). Make sure there is enough labware on the worktable for all of the copies and choose the left-most and top-most plate for the first copy. Otherwise the script which is created will contain errors (faulty script lines are marked in red).

Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

How many replicates of each well do you want to create

Select how many replications of the source plate wells you want to make (range: 1 to 24). The maximum number of replications also depends on how many wells are available on the destination plate. For example, if you want to replicate four wells three times, the replications will occupy 12 wells on each of the destination plates.

How many plate copies do you want to create

Select how many copies of the replications you want (range: 1 to 16). All of the destination plates will be identical.

Replication sequence mode

This is used to select the placement on the destination wells:

- With *12 to 1122*, Freedom EVOware pipettes all replicates of the first source column onto the destination plate, and then proceeds with the replicates of the second source column. For example, if you want to replicate columns B, C and D of the source labware and you choose three replications per plate, the destination columns will be as follows: BBBCCCDDD.
- With *12 to 1212*, Freedom EVOware pipettes a single replicate of the first column and then a single replicate of the second column, and so on. For example, if you want to replicate columns B, C and D of the source plate and you choose three replications per plate, the destination columns will be as follows: BCDBCDBCD.

Volume in destination wells

Specify the required volume of liquid in the destination wells (the same volume will be dispensed to all wells of all replicates). Freedom EVOware automatically calculates the necessary aspiration volume for the source labware. However, Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity.

15.29.3 Replicates Wizard, Step 3 of 5

Select the destination plate parameters:

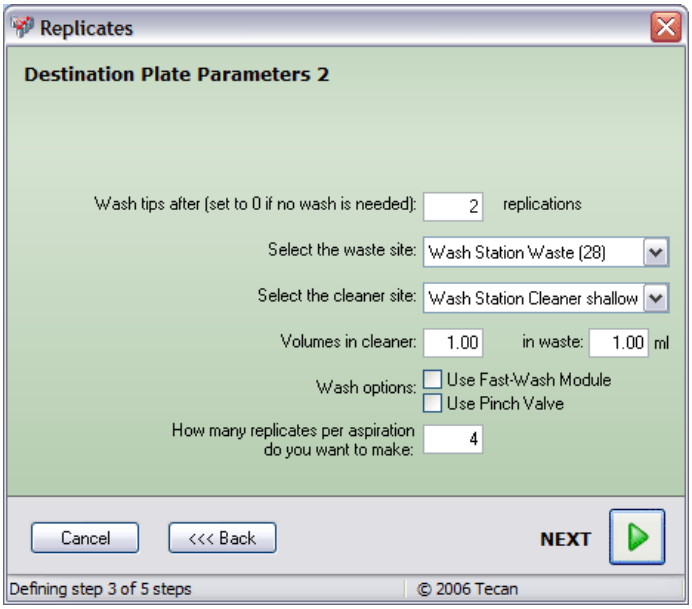


Fig. 15-36 *Replicates wizard, step 3 of 5*

Do you want to mix after dispensing

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

Wash tips after x replications

This option only appears if you are using fixed tips. Enter a non-zero value if you want to wash the tips after replicating. If you specify “1”, washing will be carried out after each replication.

Change DiTis after x replications

This option only appears if you are using DITIs (disposable tips). Enter a non-zero value if you want to replace the DITIs after replicating. If you specify “1”, the DITIs will be replaced after each replication.

The following settings for the waste and the cleaner do not appear if you have chosen “0” (i.e. “wash is not necessary” or “DITI change is not necessary”).

Select the waste site

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor. Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.

When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also 15.5 “Periodic Wash Command”, 15-10.

Select the cleaner site

This option only appears if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

Volumes in cleaner and in waste

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see 15.4 “Wash Tips Command”, 15-8.

Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

How many replicates per aspiration do you want to make

This option only appears if you chose to make more than one replicate of each well in the previous step. Specify a value greater than one to use multi-pipetting mode. With multi-pipetting mode, the liquid which is aspirated is dispensed in portions into several destination positions. With single pipetting mode, the liquid which is aspirated is dispensed into a single destination position in one step.

15.29.4 Replicates Wizard, Step 4 of 5

Select the source wells to be replicated:

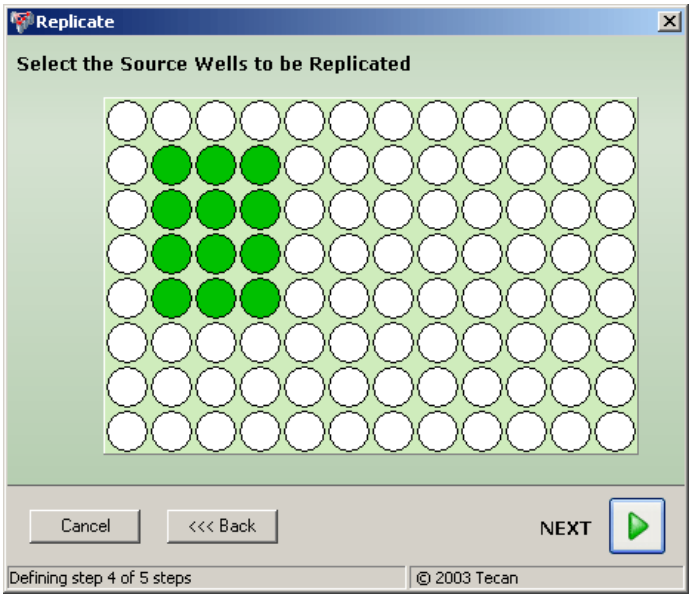


Fig. 15-37 *Replicates wizard, step 4 of 5*

Select the source wells to be replicated

Select one or more rows and columns of wells by clicking with the mouse and dragging. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware.

15.29.5 Replicates Wizard, Step 5 of 5

Select the start position (top left) of the destination wells:

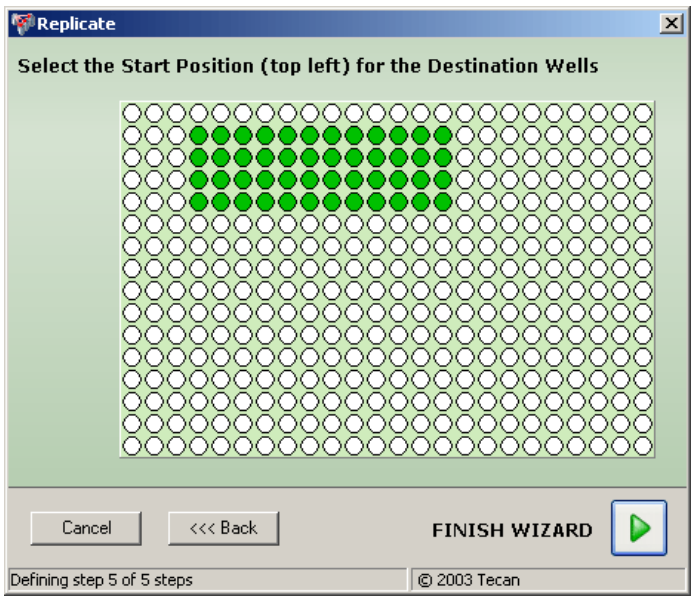


Fig. 15-38 *Replicates wizard, step 5 of 5*

Select the start position (top left) of the destination wells

Select the required position of the destination wells by clicking with the mouse. The same selection of wells will be used for all destination plates. An error message will be displayed if the position you choose does not allow all of the replicated wells to fit on the destination plate (to avoid this, choose a start position towards the top left of the plate).

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

Note: *Click the "-" button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The "-" button changes to "+". Click the "+" button to show the script lines again.*

15.30 Serial Dilution Wizard

The Serial Dilution wizard creates a set of script commands which perform a serial dilution in two or more steps. Each dilution step has the same dilution factor.

After you have completed all of the steps in the wizard, it creates script commands which carry out the required actions and inserts them in the Script Editor window at the currently selected position. If necessary, the script commands can then be edited if you want to include some special features.

15.30.1 Serial Dilution Wizard, Step 1 of 6

Select the dilution parameters:

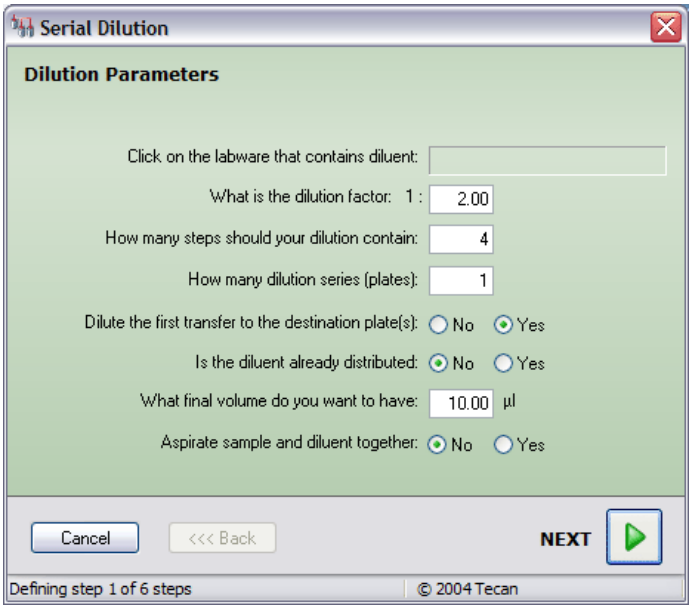

Serial Dilution
Dilution Parameters
Click on the labware that contains diluent:
What is the dilution factor: 1 :
2.00
How many steps should your dilution contain:
4
How many dilution series (plates):
1
Dilute the first transfer to the destination plate(s): No Yes
Is the diluent already distributed: No Yes
What final volume do you want to have:
10.00
µl
Aspirate sample and diluent together: No Yes
Cancel
<<< Back
NEXT
Defining step 1 of 6 steps
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Fig. 15-39 *Serial Dilution wizard, step 1 of 6*

Click on the labware that contains the diluent

Select the plate which contains the diluent by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

What is the dilution factor

Specify the required dilution factor per step (range: 1.1 to 1000). Each dilution step has the same dilution factor. The following table lists the dilution in percent for six different dilution factors:

Tab. 15-11 *Dilution in percent for six different dilution factors*

Dilution factor	Sample % : Diluent %
1:2	50% : 50%
1:4	25% : 75%
1:8	12.5% : 87.5%
1:16	6.25% : 93.75%
1:32	3.125% : 96.875%
1:64	1.5625% : 98.4375%

How many steps should your dilution contain

Specify the required number of steps (range: 2 to 24). Example: if you specify a dilution of 1:2 per step and a total of 3 steps, the destination plate(s) will all have three columns of wells with dilution factors of 1:2, 1:4 and 1:8. See also “Is the source concentration equal to the first step”.

How many dilution series (plates)

Specify how many destination plates you want to make (range: 1 to 16). All of the destination plates will be identical.

Dilute the first transfer to the destination plate(s)

Click *No* if you want the first column in the destination plate(s) to contain the undiluted sample. Example: if you choose *No* and specify a dilution of 1:2 per step and a total of 3 steps, the destination plate(s) will all have three columns of wells with dilution factors of “undiluted”, 1:2 and 1:4.

Is the diluent already distributed

Click *Yes* if the destination wells in the destination plate(s) already contain diluent. In this case, you must specify how much diluent is contained in each well, and the Serial Dilution wizard only needs to aspirate and dispense the appropriate quantities of the sample liquid. Tip: You can dispense diluent to the destination wells using the Replicates wizard.
How much diluent is dispensed in each well: Specify how much diluent is already contained in each destination well.

What final volume do you want to have

Specify the required total volume (sample plus diluent) in each of the destination wells.

Aspirate sample and diluent together

Click *Yes* if you want to aspirate the sample directly after aspirating the diluent. Click *No* if you want to dispense the diluent into the destination wells before aspirating and dispensing the sample. Be aware of the risk of contamination if you choose *Yes*.

15.30.2 Serial Dilution Wizard, Step 2 of 6

Select the source parameters:

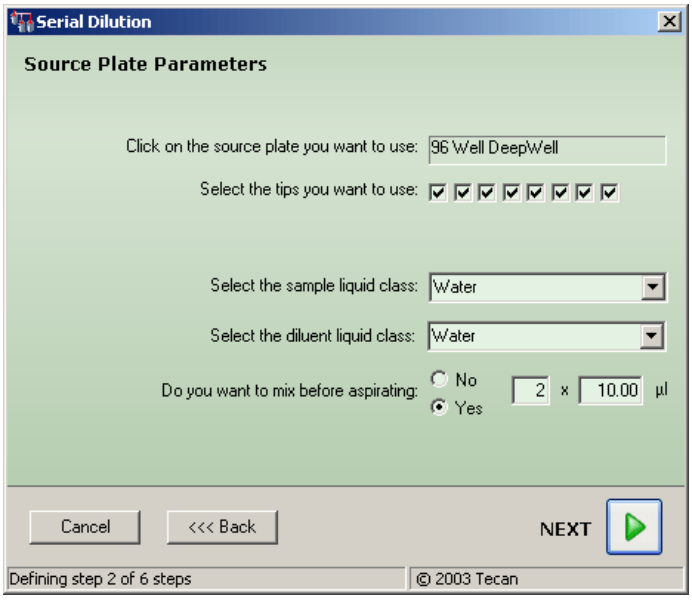

Fig. 15-40 *Serial Dilution wizard, step 2 of 6*

Click on the source plate you want to use

Select the source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Select the tips you want to use

Check the appropriate checkboxes.

Note: *The Serial Dilution wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).*

Click on the DITI rack you want to use

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Select the sample liquid class

Choose the required liquid class for the sample from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also 10 “Configuring Liquid Classes”, 10-1.

Select the diluent liquid class

Choose the required liquid class for the diluent from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Do you want to mix before aspirating

Click the appropriate radio button. If you choose *Yes*, you must also specify how many times to mix and the volume to mix with.

15.30.3 Serial Dilution Wizard, Step 3 of 6

Select the destination parameters:

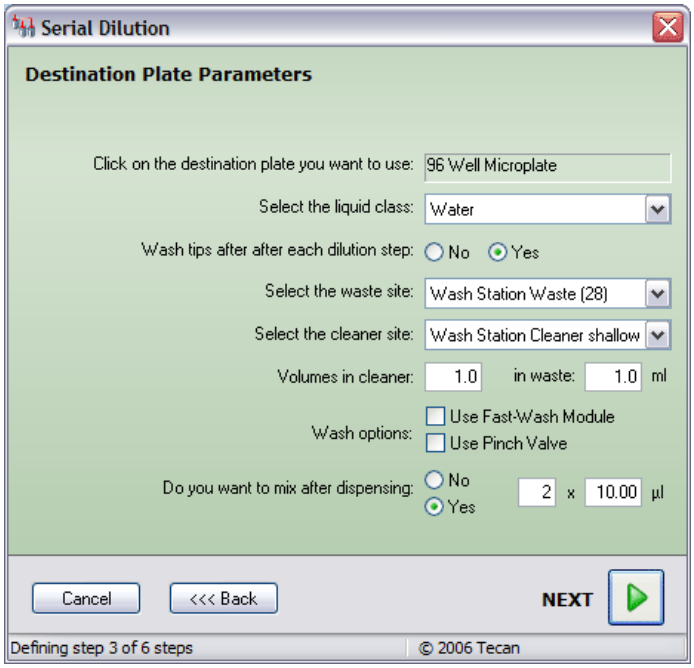

Fig. 15-41 *Serial Dilution wizard, step 3 of 6*

Click on the destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

If you have chosen to make more than one curve (destination plate), Freedom EVOware will choose additional labware of the same type automatically by searching the worktable from rear to front and then from left to right (you cannot select it yourself). Make sure there is enough labware on the worktable for all of the copies and choose the left-most and top-most plate for the first copy. Otherwise the script which is created will contain errors (faulty script lines are marked in red).

Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Wash tips after each dilution step

This option only appears if you are using fixed tips. Click *Yes* if you want to wash the tips after each dilution step.

Change DiTis after each dilution step

This option only appears if you are using DITIs (disposable tips). Click *Yes* if you want to replace the DITIs after each dilution step.

The following settings for the waste and the cleaner do not appear if you have chosen *No* (i.e. “wash is not necessary” or “DITI change is not necessary”):

Select the waste site

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor.Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.

When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also 15.5 “Periodic Wash Command”, 15-10.

Select the cleaner site

This option only appears if you have if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

Volumes in cleaner and in waste

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see 15.4 “Wash Tips Command”, 15-8.

Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

Do you want to mix after dispensing

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

15.30.4 Serial Dilution Wizard, Step 4 of 6

Select the tip position of the diluent source:

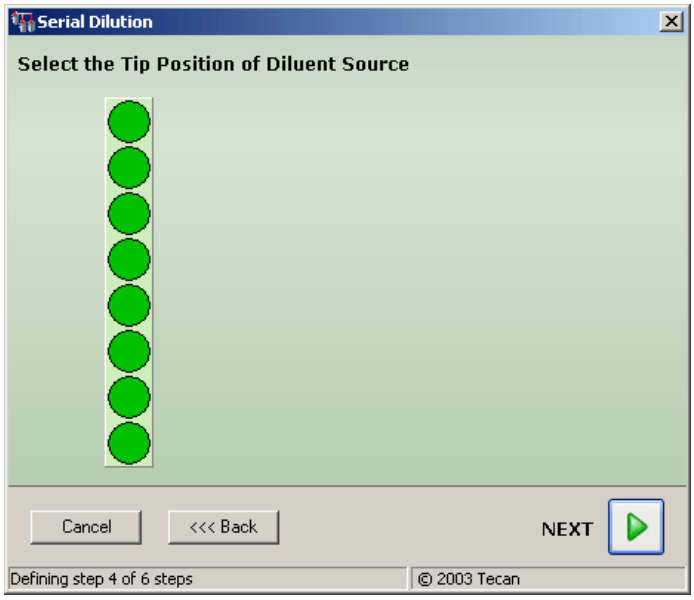

Fig. 15-42 *Serial Dilution wizard, step 4 of 6*

Select the tip position of the diluent source

Select the tip position of the diluent source by clicking with the mouse. In the above example, the diluent will be taken from a trough (troughs only have one column).

15.30.5 Serial Dilution Wizard, Step 5 of 6

Select the sample source wells:

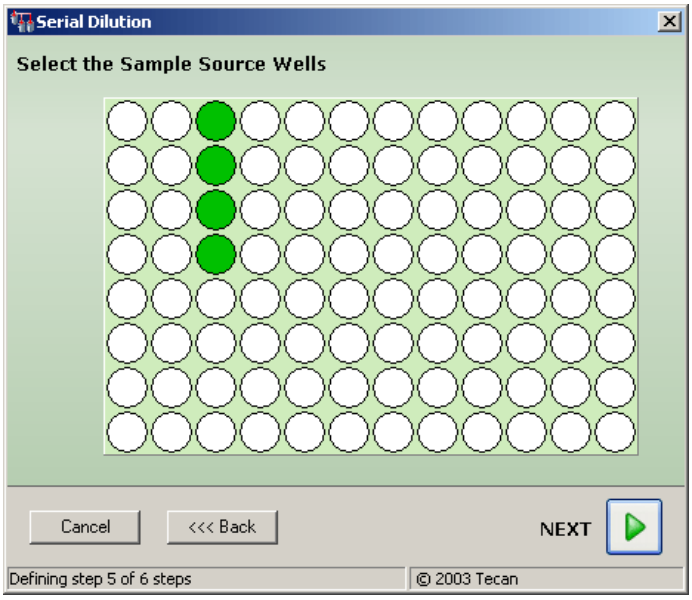

Fig. 15-43 *Serial Dilution wizard, step 5 of 6*

Select the sample source wells

Select the required number of source wells by clicking with the mouse and dragging. All of the wells are in the same column. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware.

15.30.6 Serial Dilution Wizard, Step 6 of 6

Select the start position (top left) of the destination wells:

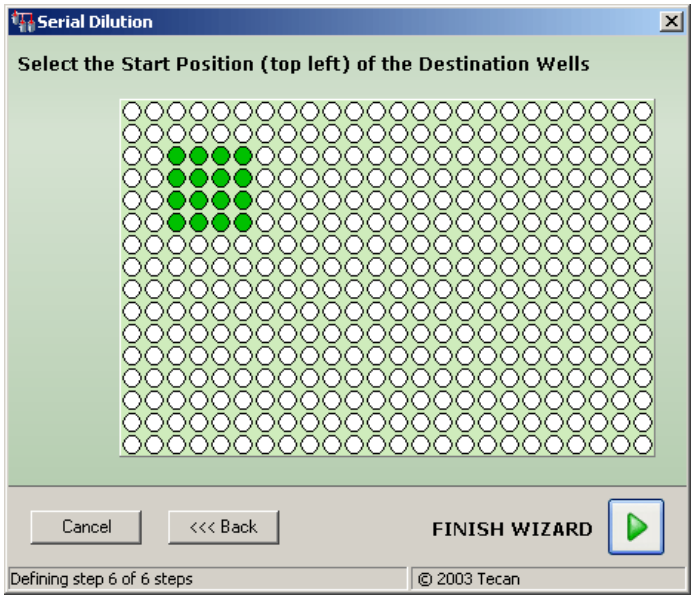

Fig. 15-44 *Serial Dilution wizard, step 6 of 6*

Select the start position (top left) of the destination wells

Select the required position of the destination wells by clicking with the mouse. The same selection of wells will be used for all destination plates. An error message will be displayed if the position you choose does not allow all of the destination wells to fit on the destination plate (to avoid this, choose a start position towards the top left of the plate).

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

Note: *Click the "-" button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The "-" button changes to "+". Click the "+" button to show the script lines again.*

15.31 Merge Plates Wizard

The Merge Plates wizard creates a set of script commands which make a destination plate (e.g. a 384 well plate) by merging together wells from one or more source plates (e.g. four 96 well plates). When merging plates, Freedom EVOware always proceeds from rear to front and then from left to right.

The number of steps which are required for the wizard depends on how many source plates you want to merge.

15.31.1 Merge Plates Wizard, Step 1 of 7

Select the common source plate parameters:

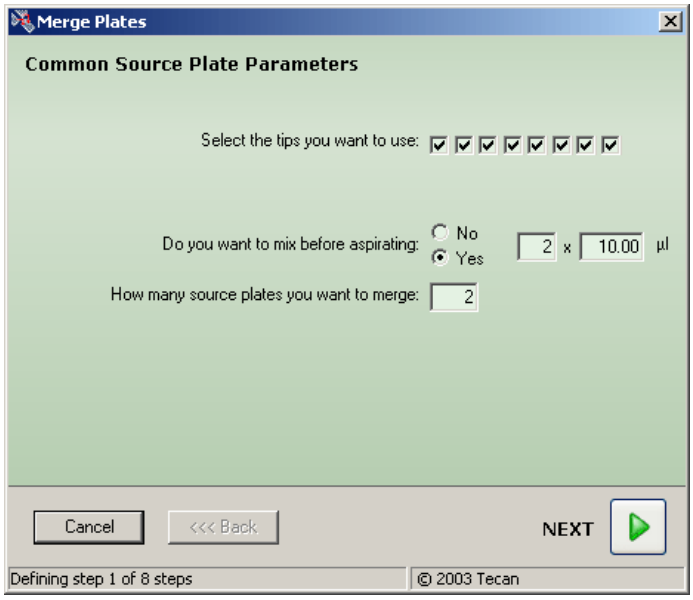

Fig. 15-45 *Merge Plates wizard, step 1 of 7*

Select the tips you want to use

Check the appropriate checkboxes.

Note: *The Merge Plates wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).*

Click on the DITI rack you want to use

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Do you want to mix before aspirating

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

How many source plates do you want to merge

Specify the number of source plates you want to merge (range: 2 to 16).

15.31.2 Merge Plates Wizard, Step 2 of 7

Select the parameters for the first source plate:

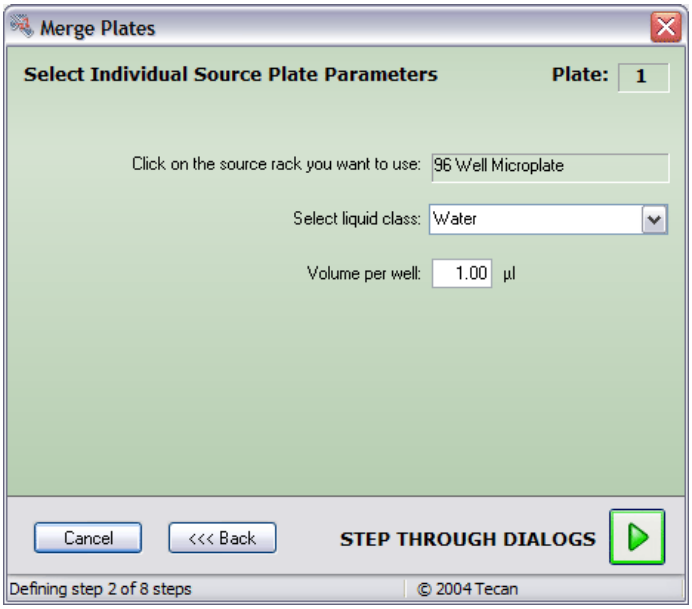

Fig. 15-46 *Merge Plates wizard, step 2 of 7*

Click on the source plate you want to use

Select the first source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item. The plate number is shown at the top right.

Select the liquid class

Choose the required liquid class for this source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also 10 “Configuring Liquid Classes”, 10-1.

Volume in well

Specify the volume of liquid you want to aspirate (the same volume will be aspirated from all wells).

15.31.3 Merge Plates Wizard, Step 3 of 7

Select the parameters for the second source plate:

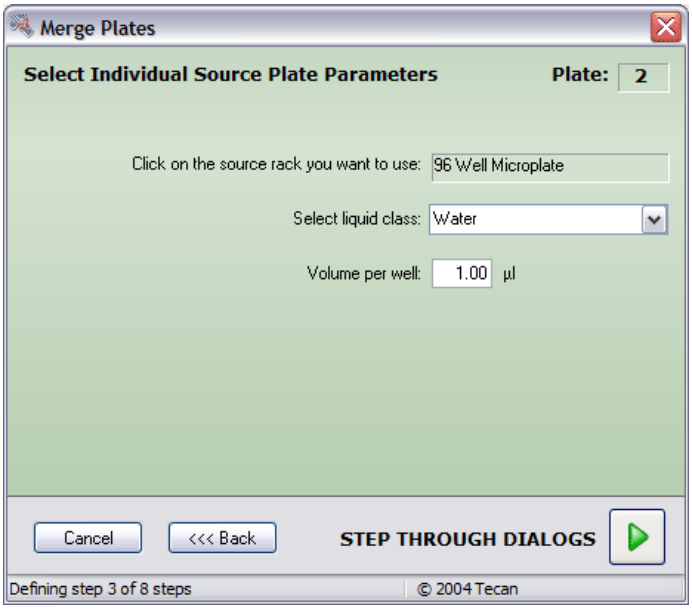

Fig. 15-47 *Merge Plates wizard, step 3 of 7*

Click on the source plate you want to use

Select the second source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item. The plate number is shown at the top right. If required, you can aspirate from the same source plate again (e.g. if you want to create a destination plate with the same samples but in different well positions).

Select the liquid class

Choose the required liquid class for this source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Volume in well

Specify the volume of liquid you want to aspirate (the same volume will be aspirated from all wells).

15.31.4 Merge Plates Wizard, Step 4 of 7

Select the destination plate parameters:

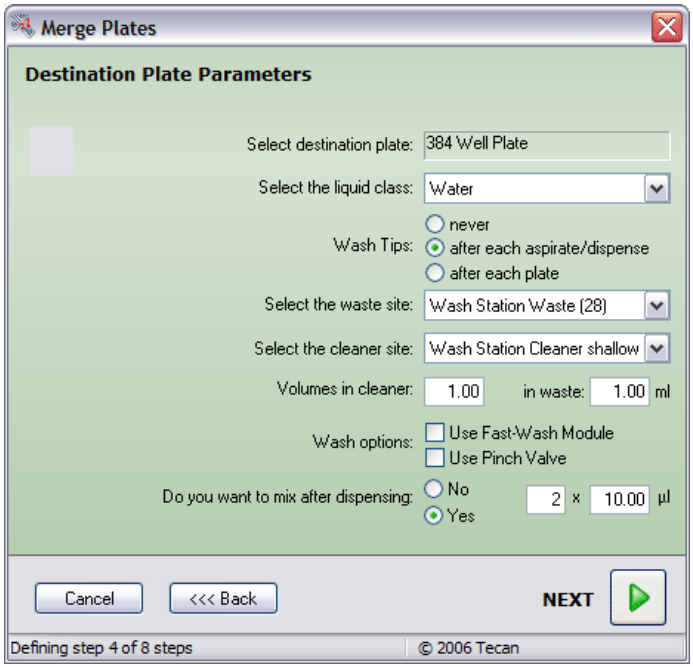

Fig. 15-48 *Merge Plates wizard, step 4 of 7*

Click on the destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Wash tips

This option only appears if you are using fixed tips. Choose the required washing method.

Change DiTis

This option only appears if you are using DITIs (disposable tips). Choose the required method for replacing the DITIs.

Select the waste site

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor. Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.

When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also 15.5 “Periodic Wash Command”, 15-10.

Select the cleaner site

This option only appears if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

Volumes in cleaner and in waste

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see 15.4 “Wash Tips Command”, 15-8.

Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

Do you want to mix after dispensing

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

15.31.5 Merge Plates Wizard, Step 5 of 7

Select the wells to be copied from the first source plate:

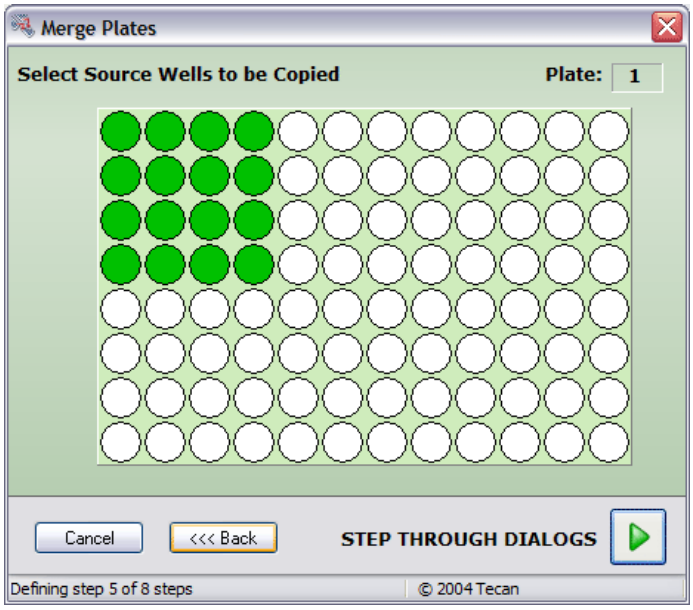

Fig. 15-49 *Merge Plates wizard, step 5 of 7*

Select the source wells to be copied

Select one or more rows and columns of wells by clicking with the mouse and dragging. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware. The plate number is shown at the top right.

15.31.6 Merge Plates Wizard, Step 6 of 7

Select the wells to be copied from the second source plate:

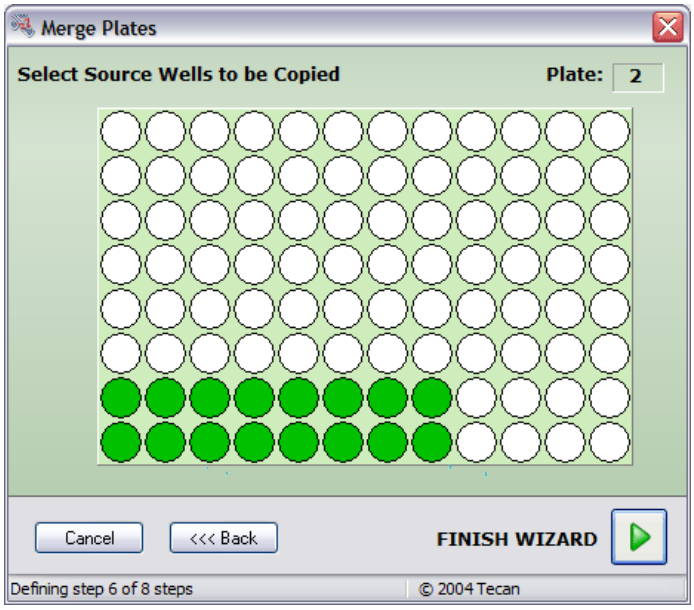

Fig. 15-50 *Merge Plates wizard, step 6 of 7*

Select the source wells to be copied

Select one or more rows and columns of wells by clicking with the mouse and dragging. Tip: the cursor shows the x and y coordinates for each well as it moves over the labware. The plate number is shown at the top right.

15.31.7 Merge Plates Wizard, Step 7 of 7

Select the destination for each source block:

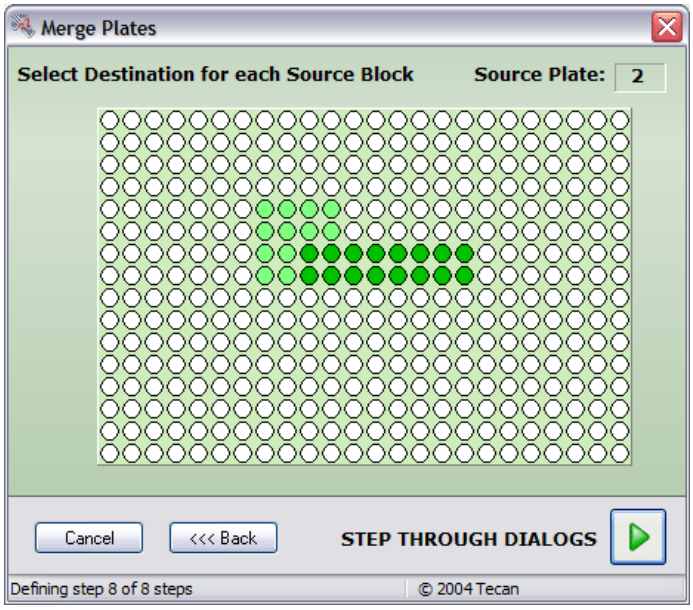

Fig. 15-51 *Merge Plates wizard, step 7 of 7*

Select the destination for each source block

Select the required position of the destination wells from the first source plate by clicking with the mouse. Click the green arrow to confirm and repeat this step until you have selected the required positions of the destination wells for all source plates. The plate number is shown at the top right. If required, you can position the wells so they overlap (e.g. if you want to mix a reagent with the samples on the destination plate).

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

Note: *Click the "-" button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The "-" button changes to "+". Click the "+" button to show the script lines again.*

15.32 Transfer Wizard

The Transfer wizard creates a set of script commands which aspirate liquid from specified wells on the source plate and transfer it to destination positions.

After you have completed all of the steps in the wizard, it creates script commands which carry out the required actions and inserts them in the Script Editor window at the currently selected position. If necessary, the script commands can then be edited if you want to include some special features.

15.32.1 Transfer Wizard, Step 1 of 4

Select the source plate parameters:

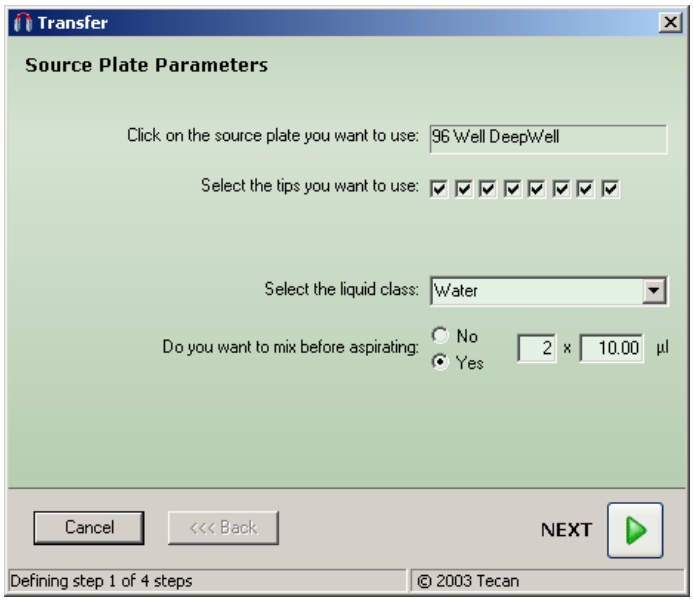

Fig. 15-52 *Transfer wizard, step 1 of 4*

Click on the source plate you want to use

Select the source plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Select the tips you want to use

Check the appropriate checkboxes.

Note: *The Transfer wizard does not allow you to use a mixture of standard tips and DITIs. If your pipetting instrument has both standard tips and DITIs, you must uncheck all standard tips before you can choose any DITIs (and vice versa).*

Click on the DITI rack you want to use

This option only appears if you are using DITIs (disposable tips). Select the DITI rack by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

Select the liquid class

Choose the required liquid class for the source plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also 10 “Configuring Liquid Classes”, 10-1.

Do you want to mix before aspirating

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

15.32.2 Transfer Wizard, Step 2 of 4

Select the destination plate parameters:

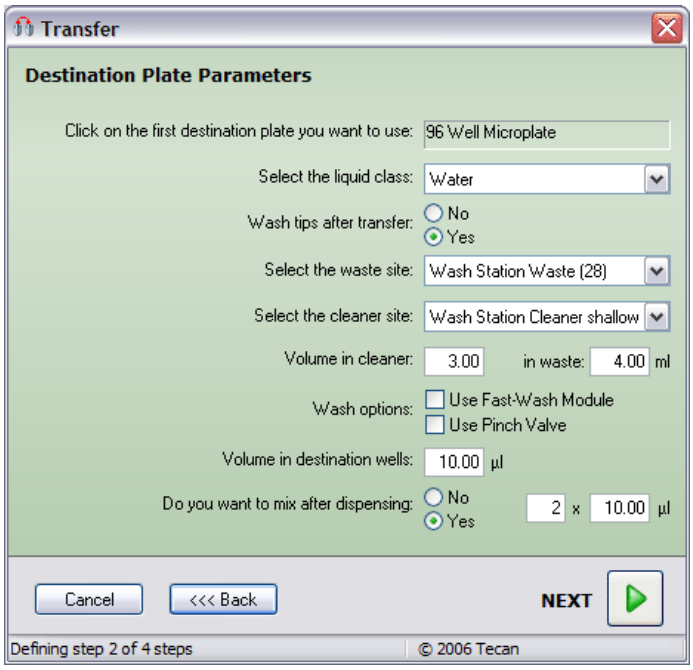

Fig. 15-53 *Transfer wizard, step 2 of 4*

Click on the first destination plate you want to use

Select the destination plate by clicking on the labware in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item.

If you have chosen to make more than one copy, Freedom EVOware will choose additional labware of the same type automatically by searching the worktable from rear to front and then from left to right (you cannot select it yourself). Make sure there is enough labware on the worktable for all of the copies and choose the left-most and top-most plate for the first copy. Otherwise the script which is created will contain errors (faulty script lines are marked in red).

Select the liquid class

Choose the required liquid class for the destination plate(s) from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Wash tips after the transfer

This option only appears if you are using fixed tips. Click *Yes* if you want to wash the tips after the transfer.

Drop DiTis after the transfer

This option only appears if you are using DITIs (disposable tips). Click *Yes* if you want to drop the DITIs after the transfer.

The following settings for the waste and the cleaner do not appear if you have chosen *No* (i.e. “wash is not necessary” or “DITI change is not necessary”):

Select the waste site

Choose the waste unit you want to use from the pull down list. The list shows all waste units which are currently positioned in the Worktable Editor. The worktable grid position is shown in brackets. You must first put a wash station with waste unit in the Worktable Editor. Alternatively, specify the worktable position for the waste by clicking on it in the Worktable Editor. If only one waste unit is present, it is chosen automatically.

When using multi-pipetting mode, Freedom EVOware uses the chosen waste for discarding the excess volume before aspirating again from the same source. See also 15.5 “Periodic Wash Command”, 15-10.

Select the cleaner site

This option only appears if you are using fixed tips. Choose the cleaner unit you want to use from the pull down list. The list shows all cleaner units which are currently positioned in the Worktable Editor. You must first put a wash station with cleaner unit in the Worktable Editor. Alternatively, specify the worktable position for the cleaner by clicking on it in the Worktable Editor. If only one cleaner unit is present, it is chosen automatically.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

Volumes in cleaner and in waste

These options only appear if you are using fixed tips. Specify the volume of system liquid which should be used to wash the outside of the tips (volume in cleaner) and to flush the inside of the tips (volume in waste). Appropriate settings are chosen automatically. For more information on washing see 15.4 “Wash Tips Command”, 15-8.

Use Fast-Wash Module

If your instrument is fitted with FWO (Fast Wash Option) or MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

Use Pinch Valve

If your instrument is fitted with the Low Volume Option, check this checkbox to activate the Low Volume Option after washing the tips.

Volume in destination wells

Specify the required volume of liquid in the destination wells (the same volume will be dispensed to all wells).

Do you want to mix after dispensing

Click the appropriate radio button. If you choose Yes, you must also specify how many times to mix and the volume to mix with.

15.32.3 Transfer Wizard, Step 3 of 4

Select the source wells to be copied:

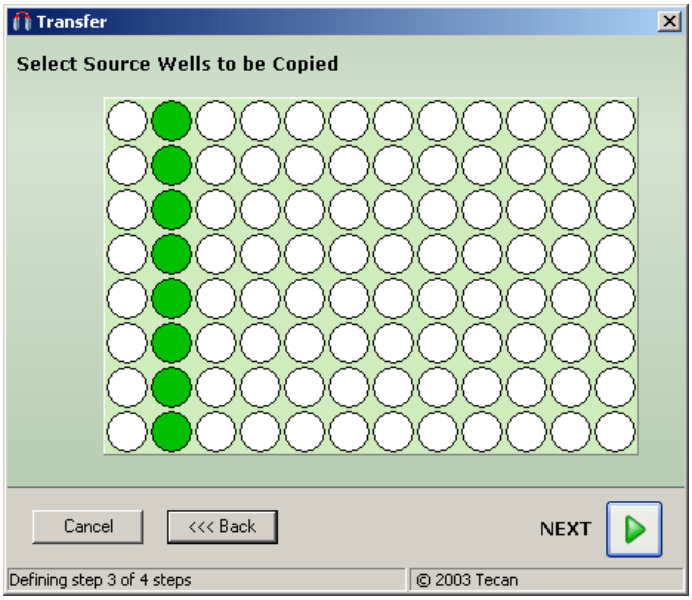

Fig. 15-54 *Transfer wizard, step 3 of 4*

Select the source wells to be copied

Select the position of the source wells by clicking with the mouse. All of the wells are in the same column.

15.32.4 Transfer Wizard, Step 4 of 4

Select the position of the destination wells:

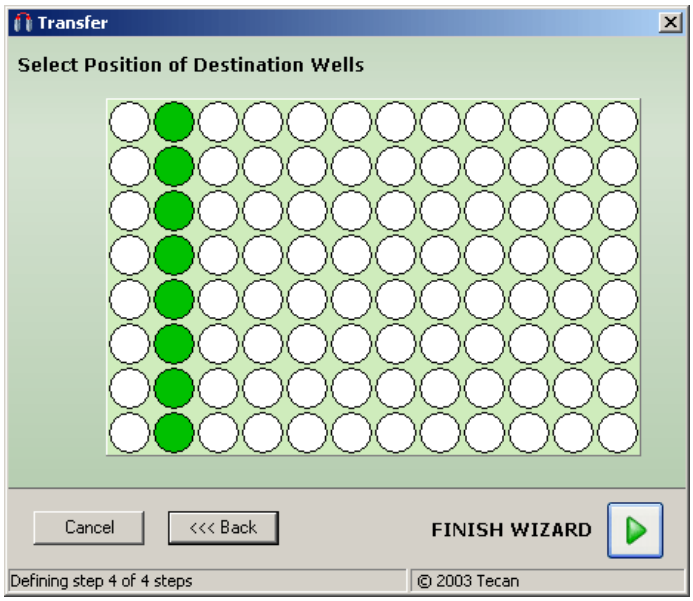

Fig. 15-55 *Transfer wizard, step 4 of 4*

Select the position of the destination wells

Select the position of the destination wells by clicking with the mouse. All of the wells are in the same column.

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

Note: *Click the "-" button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The "-" button changes to "+". Click the "+" button to show the script lines again.*

15.33 MCA Merge Plate Wizard

The MCA Merge Plate wizard creates a set of script commands for the MCA96 which merge four 96-well microplates into one 384-well microplate.

After you have completed all of the steps in the wizard, it creates script commands which carry out the required actions and inserts them in the Script Editor window at the currently selected position. If necessary, the script commands can then be edited if you want to include some special features.

15.33.1 MCA Merge Plate Wizard, Step 1 of 4

Specify the general settings for the MCA Merge Plate wizard:

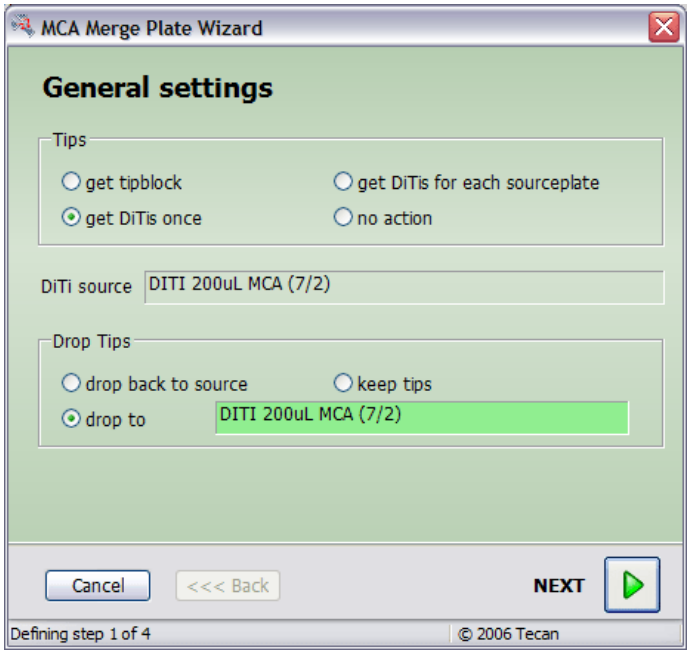

Fig. 15-56 *MCA Merge Plate wizard, step 1 of 4*

Tips

Choose the required action for getting the tipblock or the DiTis.

DiTi source

Select the location of the MCA tipblock or the first MCA DITI rack by clicking on it in the Worktable Editor. The green (protected) field then shows the label (name) of the labware that you have selected. The worktable grid and site position is shown in brackets.

If more than one MCA DiTi rack is needed, Freedom EVOware will choose additional MCA DiTi racks automatically by searching the worktable from rear to front and then from left to right. Make sure you have put enough MCA DiTi racks on the worktable and choose the left-most and top-most MCA DiTi rack in this dialog box.

You can only put MCA DiTi racks and MCA tipblocks on MCA carriers.

The script commands created by the MCA Merge Plate Wizard use the pre-defined variable RACK_OFFSET. Care must be taken if you use this pre-defined variable in other parts of your script (see 14.1.4.13 “RACK_OFFSET”, 14-7).

Drop tips

Choose the required action for dropping the tipblock or the DiTis. Specify *Keep tips* if you do not want to drop them (i.e. you want to re-use them). If you specify *Drop to*, select the location for dropping the tipblock or the DITI rack by clicking on it in the Worktable Editor.

15.33.2 MCA Merge Plate Wizard, Step 2 of 4

Choose the source plate settings:

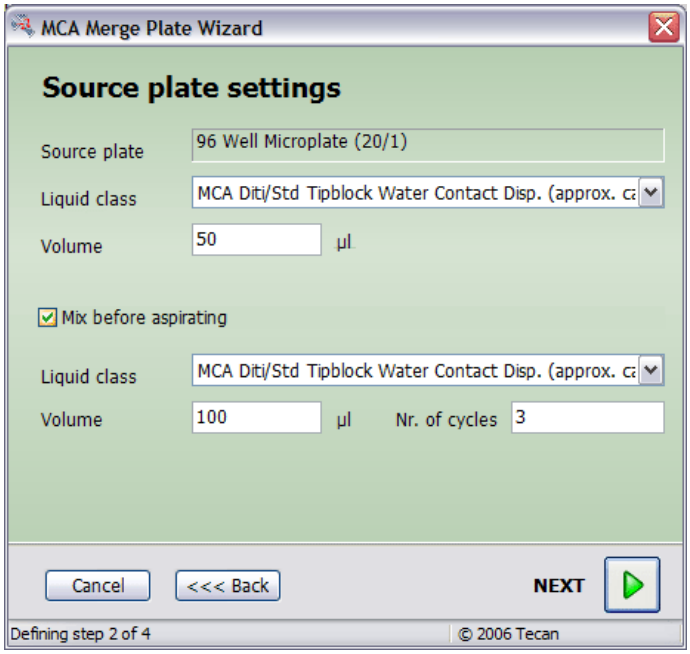

Fig. 15-57 *MCA Merge Plate wizard, step 2 of 4*

Source plate

Select the first source plate by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item. The green (protected) field then shows the label (name) of the labware that you have selected. The worktable grid and site position is shown in brackets.

Freedom EVOware will choose three more 96-well labware items of the same type automatically by searching the worktable from rear to front and then from left to right. Make sure you have put four labware items on the worktable and choose the left-most and top-most labware item in this dialog box.

The script commands created by the MCA Merge Plate Wizard use the pre-defined variable RACK_OFFSET. Care must be taken if you use this pre-defined variable in other parts of your script (see 14.1.4.13 “RACK_OFFSET”, 14-7).

Liquid class

Choose the required liquid class for aspirating from the source plates from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument. See also 10 “Configuring Liquid Classes”, 10-1.

Volume

Specify the required volume to aspirate.

Mix before aspirating

Check this checkbox if you want to mix before aspirating. If you do this, you must also specify the liquid class to use for mixing, the volume to mix with and how many times to mix.

15.33.3 MCA Merge Plate wizard, Step 3 of 4

Choose the destination plate settings:

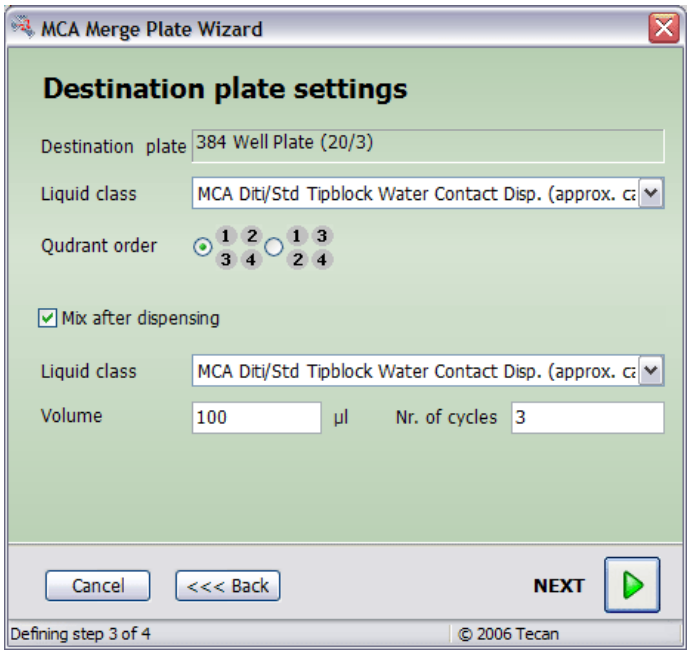

Fig. 15-58 *MCA Merge Plate wizard, step 3 of 4*

Destination plate

Select the destination plate by clicking on it in the Worktable Editor. The protected field then shows the type or the label (name) of the selected item. The green (protected) field then shows the label (name) of the labware that you have selected. The worktable grid and site position is shown in brackets.

Liquid class

Choose the required liquid class for dispensing to the destination plate from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Quadrant order

Click the radio buttons to indicate the well areas on the destination plate which will receive liquid from each of the four source plates.

Mix after dispensing

Check this checkbox if you want to mix after dispensing. If you do this, you must also specify the liquid class to use for mixing, the volume to mix with and how many times to mix.

15.33.4 MCA Merge Plate wizard, Step 4 of 4

Choosing the settings to use for washing the tips:

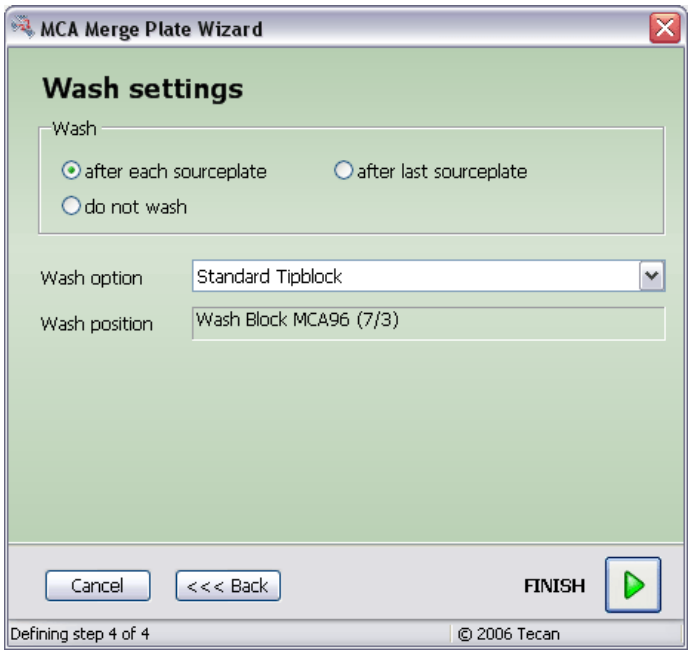

Fig. 15-59 *MCA Merge Plate wizard, step 4 of 4*

Wash panel

Click the radio buttons to choose how you want to wash.

Wash option

Different wash parameters are needed for each of the MCA tip types. Choose the MCA tip type you are using from the pull-down list. This configures the MCA Wash command which is created by the MCA Merge Plate Wizard command with the recommended wash parameters for the chosen tip type.

The parameter sets with the recommended wash parameters are stored in the evoware.opt file (see A.3 “Parameters in the Evoware.opt file”, A-17, MCA Wash Parameters). The parameters in the evoware.opt file should only be changed by specialists.

In addition to choosing the tip type in the pull-down list, if you want to wash the whole outside of the tips (the whole length) you may need to adapt the liquid class parameter "Aspiration position, Z-offset" for the liquid class which is used for the first cleaner step to ensure that the tips dip far enough into the wash liquid. A positive value for Z-offset lowers the tips. Note: You cannot change the properties of the pre-definded (standard) liquid classes. However you can create a new custom class with the same properties and then change them.

Open the MCA Wash command in the script commands which are created by the MCA Merge Plate wizard if you need to know the name of the liquid class which has been chosen for the first cleaner step.

Wash position

Select the MCA wash block you want to use by clicking on the wash block in the Worktable Editor. The green (protected) field then shows the label (name) of the MCA wash block that you have selected. The worktable grid and site position is shown in brackets.

You can only put MCA Wash Blocks on MCA carriers.

Click *Finish Wizard* when you have made all of your entries. This creates a set of script commands which carry out the required actions.

Note: *Click the "-" button in the Wizard command icon in the Script Editor if you want to collapse and hide all of the script lines between Wizard and Wizard End. The "-" button changes to "+". Click the "+" button to show the script lines again.*

15.34 Start Timer Command

The Start Timer command re-starts one of the 100 internal timers in Freedom EVOware. If required, you can use this command to re-start a specified timer several times in the same script.

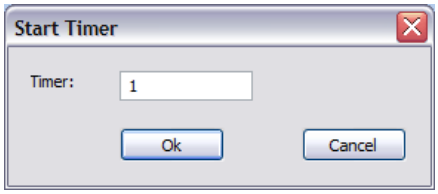

Fig. 15-60 *Start Timer command*

The parameter of the Start Timer command is as follows:

Timer

Specify the number of the timer you want to re-start or specify a numeric variable (range: 1 - 100).

Note: *Freedom EVOware automatically starts all timers when the script is started.*

15.35 Wait for Timer Command

The Wait for Timer command pauses the execution of the script until a specified number of seconds have expired since a specified timer was reset.

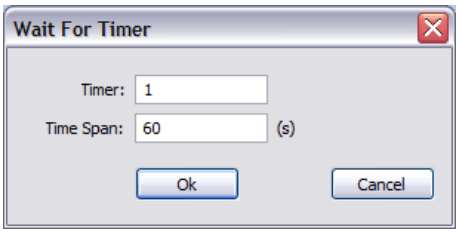

Fig. 15-61 *Wait for Timer command*

The parameters of the Wait for Timer command are as follows:

Timer

Specify the number of the timer you want to use or specify a numeric variable (range: 1 - 100).

Time Span

Specify the time duration which has to expire since the selected timer was started or reset or specify a numeric variable (range: 0.02 - 86400 seconds). The script will be paused until the specified time duration has been reached.

15.35.1 Wait for Timer Message Box

If the Freedom EVOware script contains a Wait for Timer command, the following message box is shown on the screen while the script waits for the specified time span to expire:

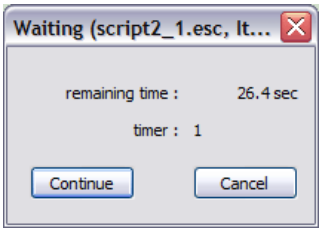

Fig. 15-62 *Wait for Timer message box, example from Freedom EVOware Plus*

The script continues automatically when the time span has expired.

The operator can click *Continue* to continue the script immediately without waiting for the specified time span to expire. This option is only available to users with Freedom EVOware Administrator or Application Specialist rights and could have an adverse effect on pipetting, depending on the purpose of the Wait for Timer command in the script.

The operator can click *Cancel* to abort the script.

The title bar shows the name of the pipetting script which displayed the prompt.

In Freedom EVOware Plus, the title bar shows the process name, script ID (normally counting from 1) and the number of the process copy which is running the script (process instance ID, counting from 1).

15.36 Execute Application Command

The Execute Application command instructs Freedom EVOware to run an external program from within a pipetting script. You can run DOS and Windows applications. Use the Execute VBScript command instead if you want to run a VB script (see 15.50 “Execute VB Script Command”, 15-114).

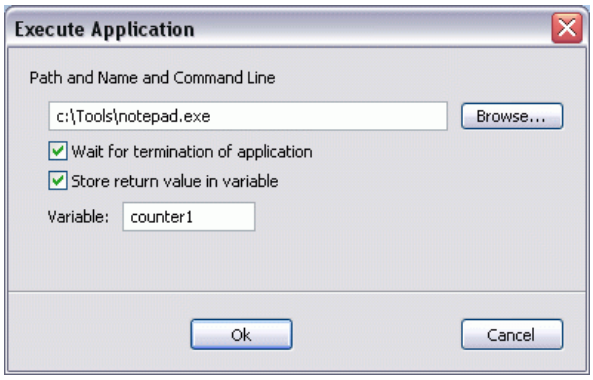

Fig. 15-63 *Execute Application command*

The parameters of the Execute Application command are as follows:

Path & Name & Command Line

Specify the filename and location of the application you want to execute. You can also specify command line parameters if required. See Fig. 14-9, 14-14 for an example of passing a variable to an external program as a command line parameter.

Wait for termination of application

If you check this checkbox, the pipetting script will wait for the external application to finish before continuing; otherwise, the pipetting script will be continued immediately.

Store return value in variable

Some external applications return an integer value when terminating (error level). Check this checkbox if you want to store the return value in a variable.

Variable: Specify the variable name. Variable names in scripts can be 1 - 64 characters in length, are not case-sensitive and must not begin with a digit.

15.37 Comment Command

The Comment command is used to insert a comment for a script command or for some other reason. It is used to annotate the script and is not executable. Use the User Prompt command instead (see 15.38 “User Prompt Command”, 15-98) if you want to prompt the instrument operator.

When you run the script, the comments are shown in the Runtime Controller of Freedom EVOware Standard. If you choose suitable comments, this can help the instrument operator to monitor the progress of the script as it runs.

Comment commands are also used as labels (jump destinations) by the Condition command (see 15.44 “Condition Command”, 15-109). Accordingly, you cannot have two Comment commands in the same script which have the same comment text.

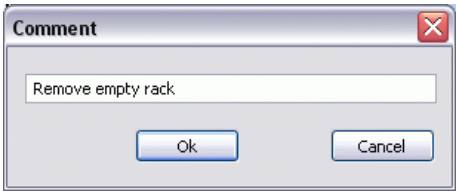

Fig. 15-64 *Comment command*

The parameter of the Comment command is as follows:

Comment

Specify the text of the comment.

The texts of the Comment commands and the corresponding script line numbers are listed as hyperlinks in the upper Infopad. Click on one of the entries to jump to the script line which contains the Comment command (**script navigation feature**).

Note: *Since the Infopads are based on XML technology, avoid using special characters which are reserved for XML tags. Above all, do not use the "<" character in your comment texts. This will cause a syntax error which is visible in the Infopad.*

The comment texts are also shown in the 3D simulation tool EVOSim. Comment texts which start with underscore ("_") or "-end" are not shown in EVOSim:

- If you are using the Comment command as a label (jump destination) for the Condition command, you can prefix the label with "_" if you want to prevent the display of the label in EVOSim (e.g. "_Label 1"). This avoids the display of comments in EVOSim which are not relevant to the operator or demonstration.
- EVOSim displays the comment texts until the next Comment command is executed in the script. In addition, it displays the last comment in the script until you start a new script or process. Use a Comment command with the special comment text "-end" if you want to clear the display of the previous comment in EVOSim. This can be useful if the previous comment refers to a pipetting operation which is only relevant temporarily (e.g. "Now getting fresh DITIs").

Common Notification Server (CNS)

If you are using the CNS, prefix the comment text with "CNS:" if you want to send the comment text as an eMail message to the currently logged in Freedom EVOware user (e.g. "CNS: Please load fresh DITI racks soon"). See A.12 "Common Notification Server (CNS)", A-82.

Comment texts which start with underscore ("_") or "-end" are not shown in the CNS web server. All other comment texts are shown in the CNS web server. See A.12.1 "CNS Web Server", A-83.

15.38 User Prompt Command

The User Prompt command is an informational command that displays a prompt on the screen as a reminder to the operator to execute a function or to perform a special action. The script is paused until the operator acknowledges the prompt (see 15.38.1 "User Prompt Message Box", 15-99).

In addition, in Freedom EVOware Standard the doorlocks are unlocked when the user prompt is shown. The doorlocks are locked again and the script continues when the operator clicks OK in the User Prompt Message Box.

Note: *If the doorlocks cannot be locked again, the Doorlock Error is displayed and the script will not continue.*

Note: *The user prompt does not unlock the doorlocks in Freedom EVOware Standard if the script contains an asynchronous subroutine which is still running.*

Note: *The user prompt does not unlock the doorlocks in Freedom EVOware Plus since other processes may still be running.*

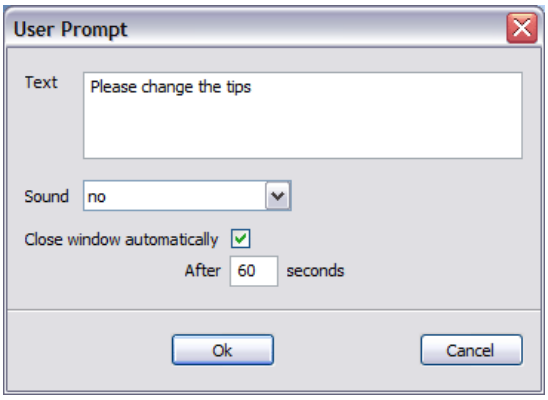

Fig. 15-65 *User Prompt command*

The parameters of the User Prompt command are as follows:

Text

Specify the required text of the prompt. If you press the ENTER key, this will insert a new line in the prompt and does not close the dialog box.

Sound

Choose one of the four available sound options:

- No sound
- Beep once
- Beep three times
- Beep every 3 seconds

Close window automatically

If you check this checkbox, Freedom EVOware automatically closes the user prompt window after the specified time and then continues with the script. Otherwise, the script will pause until the user acknowledges the prompt by clicking OK in the User Prompt message box during script runtime.

15.38.1 User Prompt Message Box

The User Prompt command pauses the script and displays the following message box during script run-time:

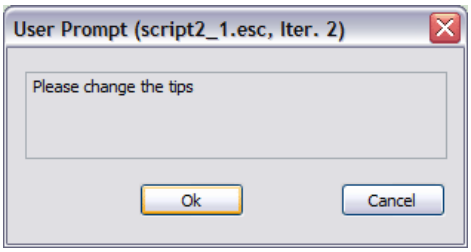

Fig. 15-66 *User Prompt message box, example from Freedom EVOware Plus*

The operator can click *OK* to acknowledge the prompt and continue the script.
The operator can click *Cancel* to abort the script.
The title bar shows the name of the pipetting script which displayed the prompt.
In Freedom EVOware Plus, the title bar shows the process name, script ID (normally counting from 1) and the number of the process copy which is running the script (process instance ID, counting from 1).

15.39 Begin Loop Command

The Begin Loop command instructs Freedom EVOware to repeat a command or a set of commands (i.e. a loop) a specified number of times until the matching End Loop command is encountered in the script.

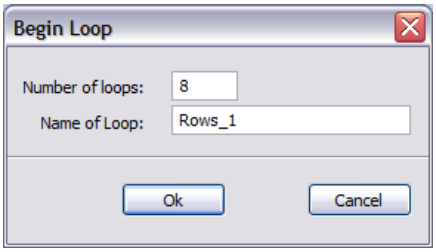

Fig. 15-67 *Begin Loop command*

The parameters of the Begin Loop command are as follows:

Number of loops

Specify the required number of times the loop should be repeated (range: 1 - 999).

Name of Loop

Specify a unique name for the loop (max. 32 characters).

15.40 End Loop Command

The End Loop command terminates the loop which is initiated by the matching Begin Loop command. The End Loop command is inserted in the script automatically when you add the Begin Loop command. Freedom EVOware uses the same loop name for the Begin Loop command and the End Loop command.

You must put the End Loop command after the last command which you want in the loop. To move the End Loop command, click on it and drag it to the required position. All of the commands within the loop will then be indented. If necessary, you can add more script commands later between the Begin Loop and End Loop commands.

The End Loop command has no parameters to configure.

15.41 Set Variable Command

The Set Variable command is used to declare (define) a numeric or string variable in a pipetting script and to assign an initial value. You can also prompt the instrument operator for the value. See 14.1 “Variables and Expressions in Scripts”, 14-1 for more information. In Freedom EVOware Plus, you can also declare variables by choosing Declare Variables in the Execute menu (see 6.4.6 “Declare Variables”, 6-12).

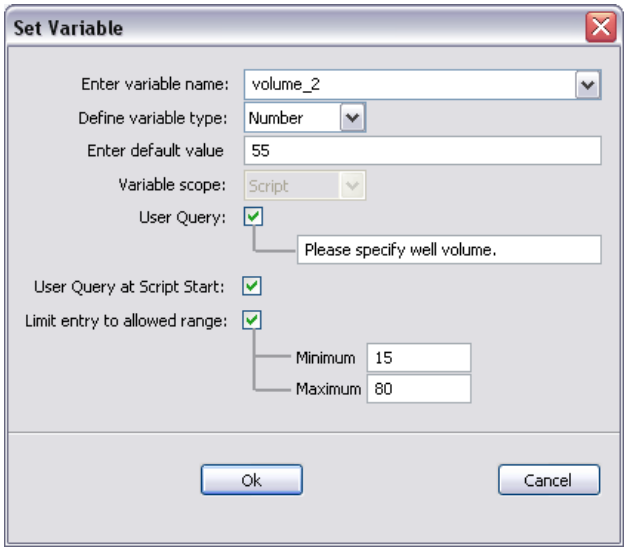

Fig. 15-68 *Set Variable command*

The parameters of the Set Variable command are as follows:

Variable name

Specify the name of the variable. Variable names in scripts can be 1 - 64 characters in length, are not case-sensitive and must not begin with a digit.

Alternatively, choose the variable from the pull-down list. The pull-down list shows all of the variables which you have used (declared) so far in your script and all of the commonly used, writable pre-defined variables which are available. See 14.1.4 “Pre-Defined Variables”, 14-4 for a complete list of pre-defined variables.

Variable type

Choose Number or String depending on the variable type you want to declare.

Variable value

Specify the integer, floating point value or string you want to assign as the initial value. The name of the *Enter variable value* field changes to *Enter default value* if you check the *User Query* checkbox (see below).

Variable scope

This setting cannot be changed and is shown for information purposes only. The scope of a variable describes the extent of validity of the variable. If you declare a variable in a script, the variable only has a meaningful value within the same script (the “scope” of the variable is “script”). In Freedom EVOware Plus, you can also declare variables which are accessible to other scripts and thus allow parameters to be passed from one script to another (see 6.4.6 “Declare Variables”, 🗎 6-12).

User Query

Check this checkbox if you want to prompt the operator for the value during script runtime instead of assigning a fixed initial value or string to the variable. The text field allows you to specify the operator prompt which should be displayed. The operator prompt also displays the default value you specified in *Enter default value*. The script will be interrupted until the required value has been entered by the operator.

See also 15.41.1 “Set Variable, Operator Prompt”, 🗎 15-102.

User Query at Script Start

Check this checkbox if you want to prompt the operator for the value of the variable when the script is first started. If you check *User Query* but do not check *User Query at Script Start*, the operator will be prompted for the value later, when the Set Variable command is executed.

If your script has several *Set Variable* commands and you check *User Query at Script Start* for all of them, the operator will be prompted for the value of all of the variables when the script is first started (see 15.41.2 “Set Variable - User Query At Script Start”, 🗎 15-103).

This is equivalent to including several *Set Variable* commands at the start of your script, but has the advantage that all of the values can be entered in a single dialog box. In addition, your script is easier to read if the *Set Variable* commands directly precede the script lines which use the variables.

This option is only available in Freedom EVOware Standard. In Freedom EVOware Plus, a similar functionality is provided by the *Declare Variables* feature in User Query mode (see 6.4.6 “Declare Variables”, 🗎 6-12)

Limit entry to allowed range

If you are prompting the operator for a numeric value, check this checkbox to limit the values which are entered to a specified range.

Minimum, Maximum: Specify the minimum and maximum values for the numeric variable. During runtime, the value which is input by the operator is validated and a warning is output if it does not lie within the specified range.

See 14.1.8 “Converting Numeric Variables and Expressions to Strings”, 🗎 14-13 and 14.1.11 “Labware Attributes and String Variables”, 🗎 14-16 for usage examples of the Set Variable command. See 14.1 “Variables and Expressions in Scripts”, 🗎 14-1 for more information on variables.

15.41.1 Set Variable, Operator Prompt

The Set Variable command displays the following operator prompt during script run-time if you have checked the *User Query* checkbox to prompt the operator for a value:

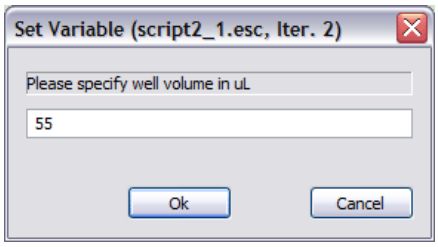

Fig. 15-69 *Set Variable operator prompt, example from Freedom EVOware Plus*

The operator should enter the requested value and click OK
The operator can click *Cancel* to abort the script.
The title bar shows the name of the pipetting script which displayed the prompt.
In Freedom EVOware Plus, the title bar shows the process name, script ID (normally counting from 1) and the number of the process copy which is running the script (process instance ID, counting from 1).

15.41.2 Set Variable - User Query At Script Start

The Set Variable command displays the following operator prompt when the script starts if you have checked the *User Query at Script Start* checkbox to prompt the operator for a value:

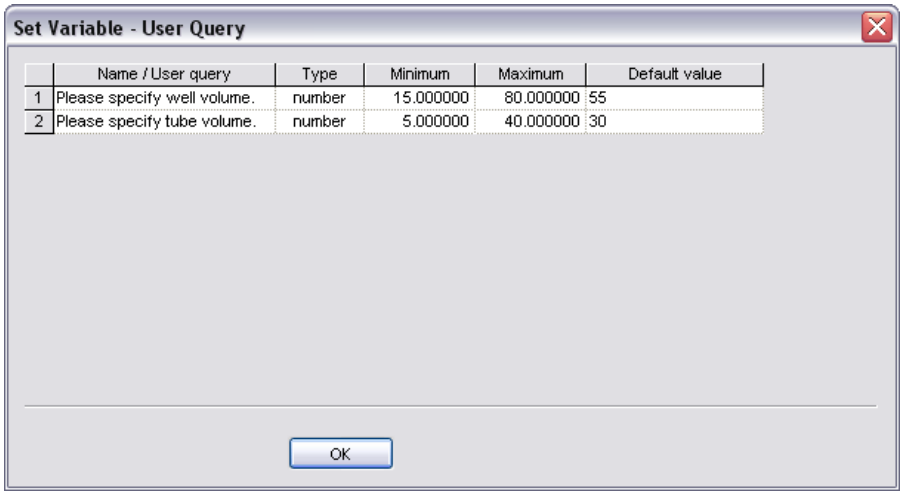

Fig. 15-70 *Set Variable - User Query operator prompt*

In the above example, the script contains two Set Variable commands with the *User Query at Script Start* feature enabled.

15.42 Import Variable Command

The Import Variable command is used to import values for script variables from a file during script runtime. You can import values for variables which are already declared (defined) in the script. You can also use this command to declare new

variables for use in the script and assign an initial value which is read from the import file. The import file can be either a comma-separated text file (.txt or .csv) or an Excel file (.xls).

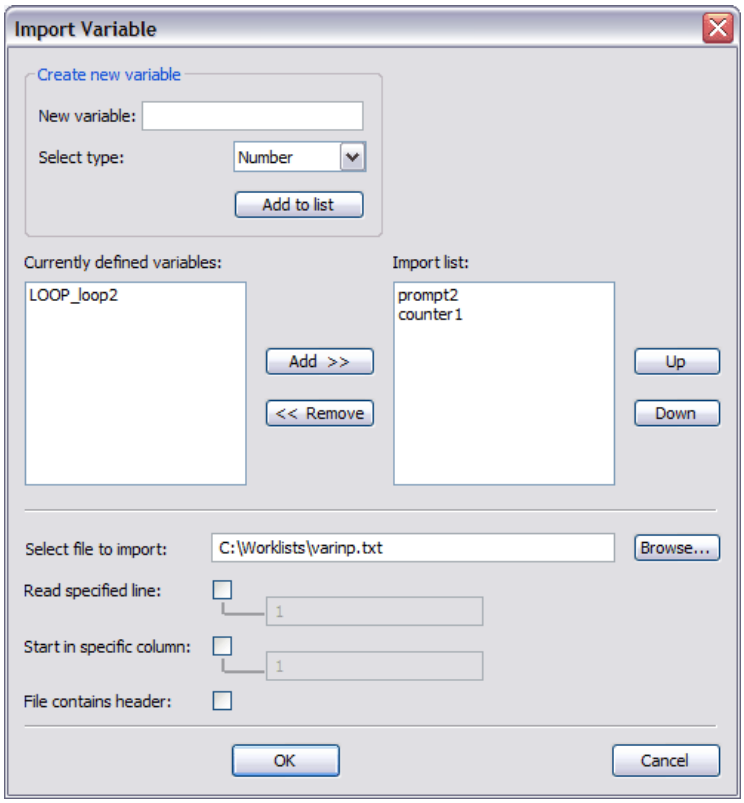

Fig. 15-71 *Import Variable command*

The parameters of the Import Variable command are as follows:

Create new variable panel

New variable

To create (declare) a new variable, enter the variable name in the *New variable* field, choose the variable type (number or string) and click *Add to list*. The new variable will be added to the Import list. The new variable will be created when the script is run. Variable names in Freedom EVOware are not case-sensitive.

Currently defined variables

This list initially shows all of the variables which are already declared in the script. It also shows the pre-defined variables which the script uses. In the above example, the pre-defined variable LOOP_loop2 was automatically declared by a Begin Loop command.

If your script contains conditional jumps or branches, the Import Variable command only lists variables in those parts of the script which are executed with the default values of the IF variables in Condition commands. It is not recommended to declare variables (e.g. with the Set Variable command) within conditional parts of the script (see 14.1.12 “Validating a Script Which Contains Variables”, 14-18).

To read a value for one of these variables from the import file, select the variable and click *Add*. This moves the variable to the Import list. Repeat this process to import more variables.

Import list

This list shows all of the variables whose values you want to import. Make sure that the import file contains values for all of the variables which you want to import. Select an entry and click *Up* or *Down* to re-arrange the order of the variables in the list. The order of the variables in the list must match the order of the fields in the import file (see below).

To remove a variable from the import list, select the variable and click *Remove*. If the variable is a pre-defined variable, it is moved back to the *Currently defined variables* list. If the variable is a newly created variable, it is deleted.

Select file to import

Specify the name and full path of the import file or click *Browse* and choose an existing file. The import file can be either a comma-separated text file (.txt or .csv) or an Excel file (.xls). The import file type is determined automatically from the filename extension which you specify.

Read specified line

Check this checkbox and specify a line number to import the values from a specified line of the import file. By default, the values will be imported from line 1. If the import file has a header, the header is not included in the line count.

Start in specified column

Check this checkbox and specify a column number to import the values starting at a specified column of the import file. By default, the values will be imported starting at column 1.

File contains header

Check this checkbox if the file contains a header with the names of the variables to import.

Import file examples with and without header

Text file without header and values for one string variable and one numeric variable:

“myprompt”,2

Text file with header and values for one string variable and two numeric variables:

prompt2,counter1,counter_2

“myprompt”,2,50

Text file with header and three sets of values for one string variable and one numeric variable:

prompt2,counter1

“myprompt”,2

“hello”,25

“goodbye”,42

If the import file has a header, it is used to determine which value should be imported to which variable. An error message will be output during script runtime if any of the variable names in the import list cannot be found in the header.

If the import file does not have a header, the values are processed from left to right. The value in the first field (Excel: column) is written to the first variable in the import list and the value in the second field is written to the second variable in the import list, etc.

If you are importing from a text file, see 15.42.2 “Field Separator for the Import Variable and Export Variable Commands”, 15-107.

15.42.1 Import Variable Default Values Dialog Box

When you click OK to insert the Import Variable command in your script, you are prompted to enter default values for the variables which you want to import:

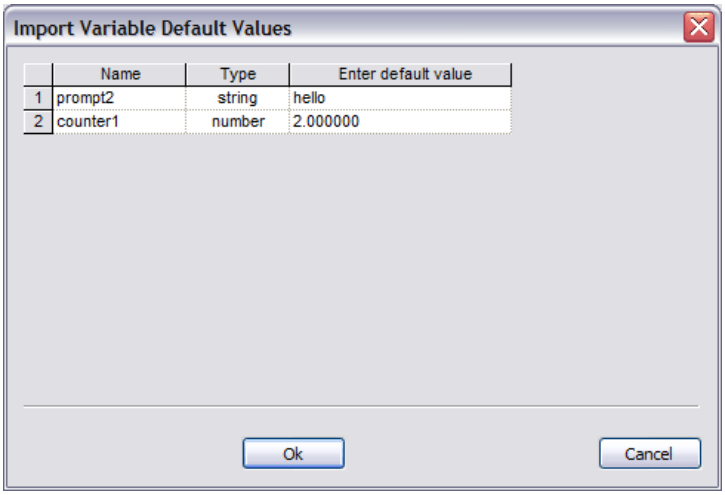

Fig. 15-72 *Import Variable Default Values dialog box*

This list shows all of the variables whose values you want to import. Variables which are already declared in the script are shown with their existing default values. Variables which will be created by the Import Variable command are shown without a default value. Make sure that a default value has been specified for all of the variables.

During script runtime, the Import Variable command reads values for the chosen variables from the specified import file. If the import file does not contain values for all of the variables which you want to import, Freedom EVOware will use the default values in the above dialog box instead if the value is missing.

15.42.2 Field Separator for the Import Variable and Export Variable Commands

The field (i.e. column) separator which is used in the import file of the Import Variable command and the export file of the Export Variable command can be configured with the parameter Csv_With_Semicolon in the Evoware.opt file (see A.3 “Parameters in the Evoware.opt file”, A-17):

Tab. 15-12 *Field separator for the Import Variable and Output Variable commands*

	field separator in the input file	**field separator in the export file**
csv_with_semicolon parameter not present in evoware.opt	semicolon	comma
csv_with_semicolon=0	comma	comma
csv_with_semicolon=1	semicolon	semicolon

If you set this parameter to 1, this simplifies opening the export file and/or creating a suitable input file using Microsoft Excel (Excel normally uses a semicolon as the field separator in csv files - depending on the MS Windows regional settings).
This parameter also affects the field separator which is used by the Export Data command.

15.43 Export Variable Command

The Export Variable command is used to export the values of script variables to a file during script runtime. The export file can be either a comma-separated text file (.txt or .csv) or an Excel file (.xls).

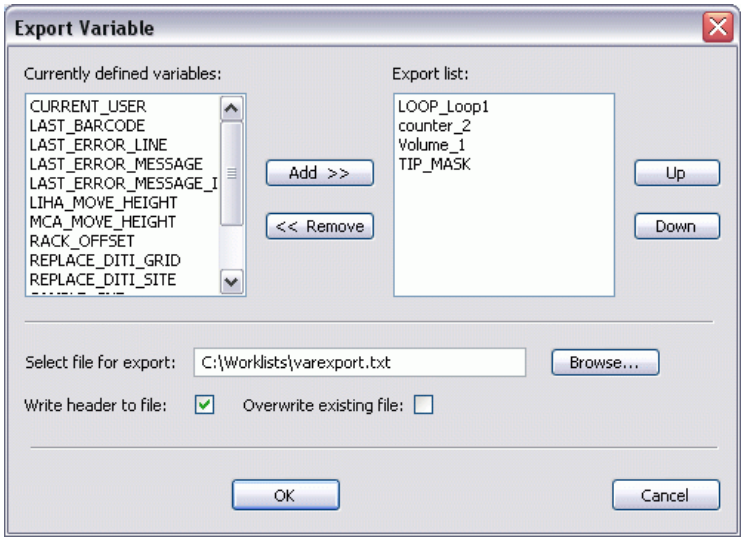

Fig. 15-73 *Export Variable command*

The parameters of the Export Variable command are as follows:

Currently defined variables

This list initially shows all of the variables which are declared in the script. It also shows the pre-defined variables which the script uses. In the above example, the pre-defined variable LOOP_loop2 was automatically declared by a Begin Loop command.

If your script contains conditional jumps or branches, the Export Variable command only lists variables in those parts of the script which are executed with the default values of the IF variables in Condition commands. It is not recommended to declare variables (e.g. with the Set Variable command) within conditional parts of the script (see 14.1.12 “Validating a Script Which Contains Variables”, 14-18).

To include a variable value in the export file, select the variable and click *Add. This moves* it to the Export list. Repeat this process to export more variables.

Export list

This list shows all of the variables whose values you want to export. Select an entry and click *Up* or *Down* to re-arrange the order of the variables in the list. The order of the variables in the list affects the order of the fields in the export file which is written (see below).

To remove a variable from the export list, select the variable and click *Remove*. This moves it back to the *Currently defined variables* list.

Select file for export

Specify the name and full path of the export file or click *Browse* and choose an existing file. The export file can be either a comma-separated text file (.txt or .csv) or an Excel file (.xls). The export file type is determined automatically from the filename extension which you specify.

Write header to file

Check this checkbox if you want the Export Variable command to write a header to the file with the names of the variables which have been exported. See also *Multiple Export Variable commands*, below.

Overwrite existing file

Check this checkbox if you want to overwrite an existing export file of the same name. If you do not check this checkbox and the export file already exists, new lines are appended to the existing file. See *Multiple Export Variable commands*, below.

Export file examples with and without header

Text file without header and values for one string variable and one numeric variable:

“myprompt”,2

Text file with header and values for one string variable and two numeric variables:

prompt2,counter1,counter_2

“myprompt”,2,50

Text file with header and three sets of values for one string variable and one numeric variable:

prompt2,counter1

“myprompt”,2

“hello”,25

“goodbye”,42

The Export Variable command processes the variables in the export list from top to bottom. The value of the first variable in the export list is written to the first field (Excel: column) and the value of the second variable in the export list is written to the second field, etc.

If you are exporting to a text file, see 15.42.2 “Field Separator for the Import Variable and Export Variable Commands”, 15-107.

Multiple Export Variable commands

If your script contains more than one Export Variable command which writes to the same export file (or the same Export Variable command is called several times), and you did not check the *Overwrite existing file* checkbox, each subsequent Export Variable command appends a new line to the export file.

If your script contains more than one Export Variable command which writes to the same export file and you have checked the *Write header to file* checkbox, subsequent Export Variable commands check whether a valid header is present in the export file before appending new lines to the export file. Valid means that the existing header is identical to the header that would be written if the command was executed on its own. Variable names in Freedom EVOware are not case-sensitive.

The following conditions must be met in this case:

- All of the Export Variable commands must specify the same variable list in the same order;
- The *Write header to file* checkbox must be checked for the first Export Variable command in the script (but does not need to be checked for all of the subsequent ones).

15.44 Condition Command

The Condition command is used to jump to a specified line in the script if a specified condition is met. You can specify a value, variable or expression on both sides of the comparison operator. If the comparison is true, Freedom EVOware continues the script at the line specified with *then goto line*.

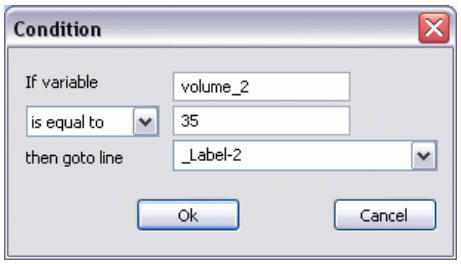

Fig. 15-74 *Condition command*

The parameters of the Condition command are as follows:

If Variable

Specify the value, numeric variable, string variable or expression to be used on the left of the comparison operator. Then specify the value, numeric variable, string or expression to be used on the right of the comparison operator in the field below the *If Variable* field.

Comparison operator

Choose one of the four comparison operators from the pull-down list:

- is equal to
- is not equal to
- is bigger than
- is less than

then goto line

Freedom EVOware uses Comment commands as labels (jump destinations) for the Condition command. Choose the required jump destination from the pull-down list. The list shows all comments which are currently defined in the script. Freedom EVOware will continue script execution at the specified line if the condition is met. Otherwise it will continue script execution at the next line in the script.

In the Comment command, it is recommended to prefix the label (jump destination) with underscore ("_"), see the above figure for an example. See 15.37 "Comment Command", 15-97 for an explanation of this recommendation.

You can also specify a name for the jump destination in advance and add the corresponding Comment command to the script later.

Note: *Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors. During validation, Freedom EVOware uses default values for the variables (see 14.1.12 "Validating a Script Which Contains Variables", 14-18). For this reason, the script might run incorrectly even if no errors are detected during validation.*

15.45 If - Then Command

The If -Then command is used to execute a set of script commands if a specified condition is met and execute a different set of commands if the condition is not met (Else condition).

The If -Then command is part of an If - Then - Else control structure. A control structure is a set of related commands which are used to control the sequence actions in your script. When you add the If - Then command to your script, an Else command and an End If command are added automatically.

If you want to execute any script commands when If -Then is true, you must put them between the If -Then command and the Else command. If you want to execute any script commands when If -Then is not true, you must put them between the Else command and the End If command.

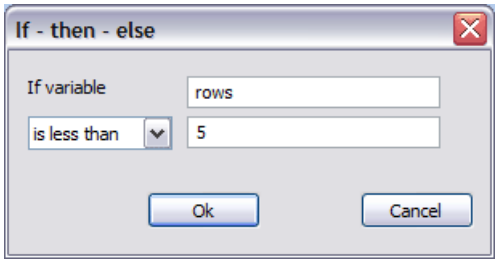

Fig. 15-75 *If - Then command*

The parameters of the If - Then command are as follows:

If Variable

Specify the value, numeric variable, string variable or expression to be used on the left of the comparison operator. Then specify the value, numeric variable, string or expression to be used on the right of the comparison operator in the field below the *If Variable* field.

Comparison operator

Choose one of the four comparison operators from the pull-down list:

- is equal to
- is not equal to
- is bigger than
- is less than

Note: *Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors. During validation, Freedom EVOware uses default values for the variables (see* *14.1.12 "Validating a Script Which Contains Variables", 14-18**). For this reason, the script might run incorrectly even if no errors are detected during validation.*

15.46 Else Command

The Else command of an If - Then - Else control structure. A control structure is a set of related commands which is used to control the sequence actions in your script. The Else command is inserted in the script automatically when you add the If - Then command.

If you want to execute any script commands when Else is true, you must put them between the Else command and the End If command.
The Else command itself has no parameters to configure.

15.47 End If Command

The End If command is the last command of an If - Then - Else control structure. A control structure is a set of related commands which is used to control the sequence actions in your script. The End If command is inserted in the script automatically when you add the If - Then command.
You must put the End If command after the last command which you want to execute when Else is true.
The End If command itself has no parameters to configure.

15.48 Group Command

The Group command is used to group together script lines to make long scripts easier to read. When you insert a Group command, a Group End command is also inserted.

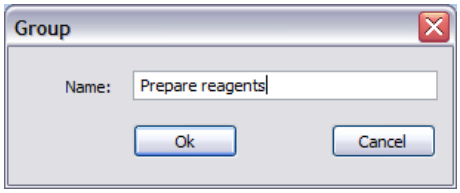

Fig. 15-76 *Group command*

After inserting the Group command in your script, put all of the script lines which belong to the group between the Group command and the Group End command. Then click the “-” button in the Group command icon in the Script Editor if you want to hide all of the script lines in the group. The “-” button changes to “+”. Click the “+” button to show the script lines again.
The parameters of the Group command are as follows

Name

Specify a descriptive name of your choice for the group.

Example of using the group command:

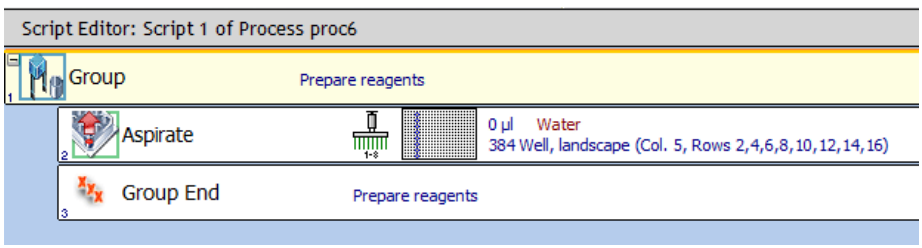

Fig. 15-77 *Group command, example*

15.49 Sub-Routine Command

The Sub-Routine command executes another script as part of the current script. See 14.3 “Sub-routines”, 14-19 for more information. The Sub-Routine command is not available in Freedom EVOware Plus.

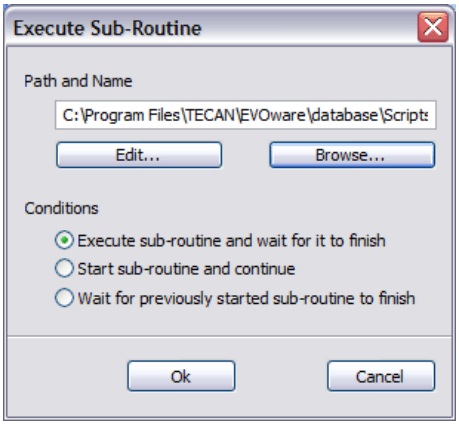

Fig. 15-78 *Sub-Routine command*

The parameters of the Sub-Routine command are as follows:

Path & Name

Specify the filename and location of the pipetting script you want to use as a sub-routine.

Edit: Click this button if you want to open the specified sub-routine in a new window for editing and/or checking.

Browse: Click this button to look for existing pipetting scripts and to choose the one you want to use as a sub-routine.

Execute sub-routine and wait for it to finish

This option causes the main pipetting script to wait for the sub-routine to finish before continuing.

Start sub-routine and continue

With this option, the main pipetting script continues without waiting for the sub-routine to finish (“asynchronous” sub-routine, i.e. asynchronous processing of the main script and the sub-routine). To allow asynchronous processing, the sub-routine must only contain the following commands:

- Aspirate
- Dispense
- Mix
- Wash Tips
- Periodic Wash
- Get DITIs
- Drop DITIs
- Set DITI Position
- Pick Up DITIs
- Set DITIs Back
- Pickup ZipTip
- Detect Liquid
- Tip Alignment Check

- Move LiHa
- Waste
- Active WashStation
- Export Data
- Manual Tip Alignment
- Start Timer
- Wait for Timer
- Execute Application
- Comment
- User Prompt
- BeginLoop
- EndLoop
- Set Variable
- ImportVariable
- ExportVariable
- Move ROMA
- ROMA Vector
- Transfer Labware
- Move PnP
- PnP Vector
- Transfer Tube
- All device commands (see 13.2 “Overview of Device Commands”, 13-12)

Wait for previously started sub-routine to finish

This option causes the main pipetting script to wait for the specified, previously started sub-routine to finish before continuing.

Note: *You can also start a sub-routine from within another sub-routine by including a Sub-Routine command within the sub-routine.*

See 14.3 “Sub-routines”, 14-19 for more information.

15.50 Execute VB Script Command

The Execute VB Script command is used to execute a Visual Basic (VB) script from within a pipetting script.

Refer to the standard Microsoft documentation for more information on VB scripts. Visit e.g. www.microsoft.com/downloads and search for Visual Basic Scripting Edition.

Provision is made to allow you to transfer numerical and string variables from the VB script to the Freedom EVOware script and vice versa.

Each time you insert a new command in your script or edit an existing command, Freedom EVOware validates the entire script to check for errors. When validating, it is not possible to execute or validate VB scripts which are called by the main script. In addition, if the main script uses variables from the VB script, you must declare them (assign values) before the VB script is called to avoid the *Variable not defined* error during validation. See 14.1.1 “Declaring Variables in Scripts”, 14-1. In Freedom EVOware Plus, you can also declare variables by choosing Declare Variables in the Execute menu (see 6.4.6 “Declare Variables”, 6-12).

If required, you can run several VB scripts simultaneously by using the Execute VB Script command more than once in your Freedom EVOware script.

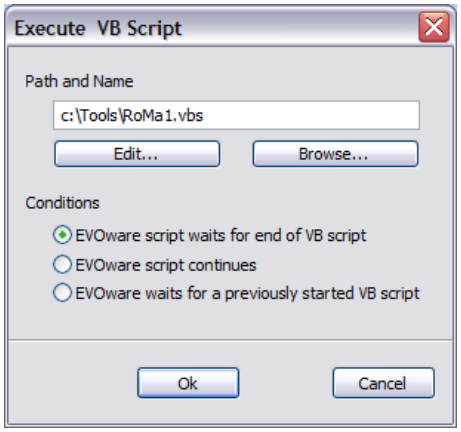

Fig. 15-79 *Execute VB Script command*

The parameters of the Execute VB Script command are as follows:

Path & Name

This edit field shows the file name and location of the VB script you want to run.

Edit: Click this button to edit the specified VB script in the Notepad editor.

Browse: Click this button to look for existing VB scripts and to choose the one you want to use.

Freedom EVOware script waits for end of VB script

This option causes the pipetting script to wait for the VB script to finish before continuing.

Freedom EVOware script continues

With this option, the pipetting script continues without waiting for the VB script to finish.

Freedom EVOware script waits for a previously started VB script

This option causes the pipetting script to wait for the specified, previously started VB script to finish before continuing.

The VB script feature in Freedom EVOware provides a new VB object "Evoware" with the following five functions:

- GetDoubleVariable: This function accepts the name of the Freedom EVOware variable as a string argument and returns a numerical value.
  Example: Evoware.GetDoubleVariable(“volume”)
- SetDoubleVariable: This function accepts the name of the Freedom EVOware variable as a string and its new numerical value as arguments.
  Example: Evoware.SetDoubleVariable “volume”,10.5
- GetStringVariable: This function accepts the name of the Freedom EVOware variable as a string argument and returns a string value.
  Example: Evoware.GetStringVariable(“barcode”)
- SetStringVariable: This function accepts the name of the Freedom EVOware variable as a string and its new string value as arguments.
  Example: Evoware.SetStringVariable “barcode”,"012345"
- SendNamedPipeCommand: This function accepts a complete named pipe command as a string argument.
  Example: Evoware.SendNamedPipeCommand(“INIT_RSP;”)

See the <install_path>\database\VBscripts directory for examples of VB scripts. The scripts are plain text files and contain a description of their intended application.

15.50.1 Menu Items for VB Scripts

See 6.4.5.1 “Creating Custom Menu Items for VB Scripts”, 6-12. The menu items are shown in the Execute menu and allow VB scripts to be executed manually outside of a pipetting script.

15.51 Notification Command

The Notification command is used to send an eMail from within a script (e.g. to inform an operator in another room that a certain process has finished). It can also be used to send an automatic eMail if an error occurs during script execution.

The Notification command sends the eMail using the notification feature in Freedom EVOware. The notification feature requires either the MAPI service to be installed or access to an SMTP server (mail server). See 8.3.2 “Notifications Section”, 8-12.

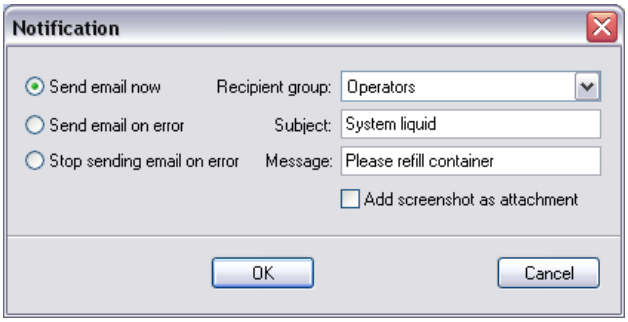

Fig. 15-80 *Notification command*

The parameters of the Notification command are as follows:

Recipient group

Freedom EVOware can be configured to send messages about system events and error situations to specific groups of users. The groups are configured with the Configuration Tool (see 8.3.2 “Notifications Section”, 8-12, Groups tab). Choose the user group which should be notified from the pull-down list. You must configure the groups first.

Subject

Specify the subject of the email.

Message

Specify the message you want to send.

Send email now

Sends an eMail immediately.

Send email on error

An eMail will be send to the specified address each time Freedom EVOware displays an error dialog box.

Stop sending email on error

No eMails will be sent any more when errors occur. This option is used to disable a previous *Send email on error* command.

Address

Specify the recipient's eMail address.

Add screenshot as attachment

If you check this checkbox, a screenshot of the current screen will be attached to the eMail which is sent.

15.52 Start Script Command

The Start Script command starts another script from the currently running script. In contrast to sub-routines, the new script can use a different worktable layout to the original script. The Start Script command is not available in Freedom EVOware Plus.

The Start Script command terminates the currently executing script, closes it, loads and validates another script and starts it if there were no errors. If errors are found, the faulty script lines are marked in red and the new script is not executed.

When executing the Start Script command, Freedom EVOware reacts as if the first script has terminated normally and the user manually loaded and started the new script.

This means that the new script is not validated during validation of the first script, worklists which have been loaded in the first script are not available in the new script and variables and timers cannot be passed from the first script to the new script.

Note: *Freedom EVOware Plus allows you to declare variables which can be shared between different scripts (see* *6.4.6 "Declare Variables", 6-12**).*

If the new script uses a different worktable layout to the original script, you must make sure that objects (e.g. labware) of the required types have been placed in the right positions on the instrument's worktable before the new script is executed.

The Start Script command is not allowed in sub-routines and advanced worklists.

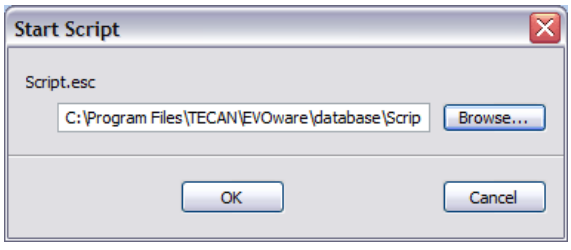

Fig. 15-81 *Start Script command*

The parameters of the Start Script command are as follows:

Edit field

Specify the filename and location of the Freedom EVOware script you want to start.

Browse: Click this button to look for existing Freedom EVOware scripts and to choose the one you want to start.

15.53 On Error Goto Command

The On Error Goto command is used to jump to a specified line in the script if an error occurs during script runtime. Error recovery commands then allow the pipetting script to react automatically to the error.

For example, to recover from a liquid error due to insufficient liquid, use the pre-defined variable RACK_OFFSET in the Aspirate command to specify the labware location and use the On Error Goto command to jump to error recovery commands. The error recovery commands then modify the value of RACK_OFFSET to aspirate from another container which has enough liquid. An elegant way to program this uses the On Error Goto command together with the Resume command (see 15.54 “Resume Command”, 15-119).

If you do not use the On Error Goto command, many of the runtime errors would otherwise pause the pipetting script and display a dialog box for operator intervention (see 18.1 “Error Dialogs”, 18-1).

The On Error Goto command will only respond to the error if the error would otherwise result in an error dialog. For example, if you have configured the error reaction in the Aspirate tab of the liquid class as “pipette air” or “go to z-max” instead of “user prompt”, a liquid detection error would not otherwise cause an error dialog to appear and will be ignored by the On Error Goto command.

Specifically, the On Error Goto command responds to the following error dialogs:

- Liquid Detection Error
- Clot Error
- Clot Error (PMP)
- PMP Instrument Error
- Liquid Arrival Check Error
- Volume Monitoring Error
- Diluter Error
- Error Fetching DITIs
- Error Mounting DITIs
- Lost DITI Error
- DITI Already Mounted Error
- Grip Error
- Te-MO DITI Error
- WRC / Te-MO Error
- WRC Errors

In the case of Diluter Error and PMP Instrument Error, the affected dilutors are automatically switched off and the tip status is set to “broken” to prevent them from being used for any further pipetting (as if the user had clicked the “Deactivate” button in the Diluter Error dialog box).

Of course, some types of error cannot be resolved automatically. In this case, the On Error Goto command could for example call the Notification command to send an eMail which alerts someone to the problem.

The On Error Goto command must precede the script command which could generate an error.

Fig. 15-82 *On Error Goto command*

The parameters of the On Error Goto command are as follows:

then goto line

Specify the jump destination for the On Error Goto command as a line number in the script. Freedom EVOware will continue script execution at the specified line if an error is detected. Otherwise it will continue script execution at the next line in the script. The jump destination can also be specified using a variable or expression, for example Err_Recovery+1.

The line number you specify in this command is automatically adjusted if you add or remove lines from the script.

Deactivate error handling

Choose this option if you want to switch off automatic error handling again if it was enabled earlier on in the pipetting script.

You can use the On Error Goto command several times in the same script. For example, you could use an On Error Goto command prior to a Get DITis command to handle a problem with getting DITIs and a second On Error Goto command prior to a pipetting operation to handle a liquid detection error.

Note: *last_error_line is a read-only, pre-defined variable which contains the line number in the pipetting script of the last command which reported an error during script runtime. Information on the last script error which was reported is contained in the pre-defined variables last_error_message and last_error_message_id. See* *14.1.4 “Pre-Defined Variables”, 14-4**.*

15.54 Resume Command

The Resume command is used together with the On Error Goto command and specifies where to resume running the script after executing the error recovery commands.

The On Error Goto command is used to jump to a specified line in the script if an error occurs during script runtime. Error recovery commands then allow the pipetting script to react automatically to the error (see 15.53 “On Error Goto Command”, 15-118).

Use a Resume command in the last line of the error recovery section if you want script execution to return to the main part of the script or to another, specified place in the script .

For example, to recover from a liquid error due to insufficient liquid, use the pre-defined variable RACK_OFFSET in the Aspirate command to specify the labware location and use the On Error Goto command to jump to error recovery commands. The error recovery commands then modify the value of RACK_OFFSET to aspirate from another container which has enough liquid and the Resume command returns program control to the Aspirate command again.

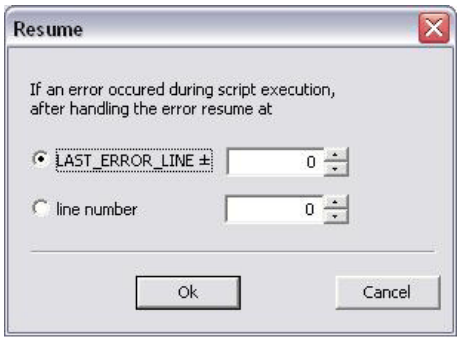

Fig. 15-83 *Resume command*

The parameters of the On Error Goto command are as follows:

Last_Error_Line ±

Choose this option if you want to return to the script line which caused the error. You can also specify an offset if required. For example, if you specify -1, script execution will return to the line which directly preceeded the script line which caused the error:

Line number

Choose this option and specify a line number in the script if you want to go to an absolute position in the script after handling the error.

You can use the On Error Goto command several times in the same script. For example, you could use an On Error Goto command prior to a Get DITis command to handle a problem with getting DITIs and a second On Error Goto command prior to a pipetting operation to handle a liquid detection error. The Resume command always applies to the last script runtime error and the last On Error Goto command which was executed.

Note: *Last_Error_Line is a read-only, pre-defined variable which contains the line number in the pipetting script of the last command which reported an error during script runtime. See* *14.1.4 "Pre-Defined Variables", 14-4.*

15.55 End Script Command

The End Script command is used to stop the pipetting script prematurely and to specify a return code (error code) for the script. It is typically used together with error recovery commands.

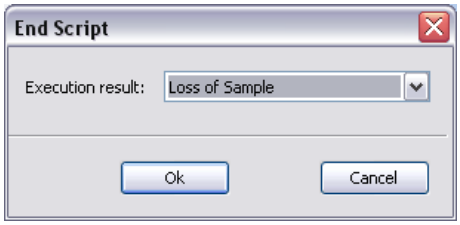

Fig. 15-84 *End Script command*

The parameters of the End Script command are as follows:

Execution code

Choose the required return code (error code) for the script. You can choose between No Error, Loss of Sample and Loss of Peripheral. The return code is reported in the log files.

Note: *Information on the last script error which was reported is contained in the pre-defined variables last_error_message and last_error_message_id. If you put several End Script commands in the script, if runtime errors occur you can jump to an End Script command which has the appropriate return code. See* *14.1.4 "Pre-Defined Variables", 14-4**.*

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If the return code for the script is Loss of Sample, the labware will not be used any more (because the pipetting was not carried out correctly) and it will be returned to the base position, e.g. the carousel. If more labware is available, the process will continue with the new labware. The process will be stopped if the return code is Loss of Peripheral.

15.56 Te-MO Commands

The Te-MO (Tecan Multi-Pipetting Option - not to be confused with multi-pipetting mode) is a robot pipetting device which can be mounted on the worktable of the pipetting instrument. It is equipped with a specially designed multi-pipetting head which can pipette to 96 or 384 wells simultaneously, resulting in an extremely high throughput and efficiency. For mechanical reasons, the same volume is pipetted by all of the tips. The Te-MO is available as the Te-MO 3/5 (3 slides, 5 carriers per slide) and the Te-MO 3/3 (3 slides, 3 carriers per slide).

The Te-MO can be fitted with a 96-tip or 384-tip pipetting head. The 96-tip head can be fitted with a tipblock (a replaceable block with 96 tips) or with DITIs. The spacing between the tips is fixed (96-tip head: 9 mm; 384-tip head: 4.5 mm).

In contrast to the Te-MO 96, the Te-MO 384 uses a liquid system in the same way as the LiHa. This allows the tips and the pipetting head to be flushed from the inside. To do this, the system liquid is pumped into the pipetting head and flows through the tips before being discarded into the Te-MO 384 Wash Block, which is part of the Te-MO 384 Wash & Refill Center (WRC). Due to its special design, the Te-MO 384 pipetting head cannot be fitted with DITIs.

Freedom EVOware is provided with special liquid classes which should be used for pipetting with the Te-MO.

The Te-MO 3/5 can be fitted with the Te-MO stacker option (the stacker cannot be fitted to the smaller Te-MO 3/3 version). Stackers are used to store a stack of labware and to present it to the instrument for pipetting operations. The labware can then be returned to the stacker for subsequent actions.

15.56.1 Te-MO Aspirate Command

The Te-MO Aspirate command is used to pick up liquid from specified positions on the Te-MO. It is analogous to the Aspirate command for the LiHa.

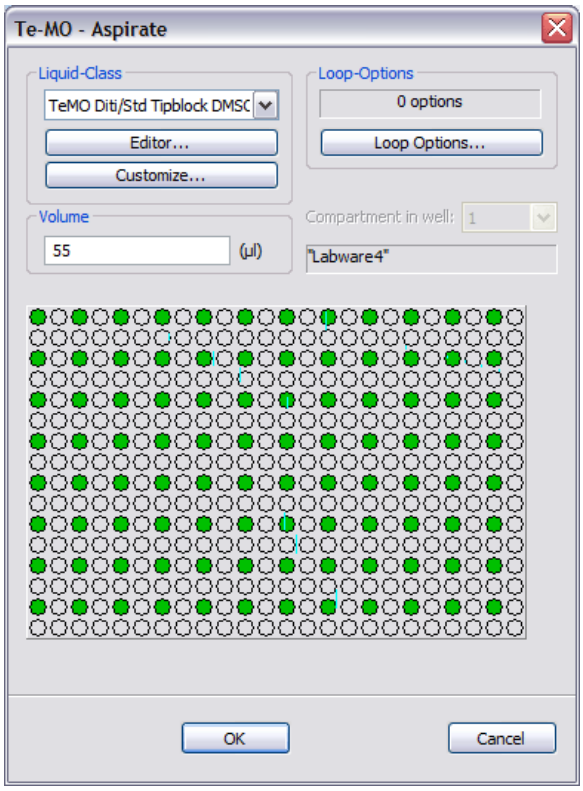

Fig. 15-85 *Te-MO Aspirate command*

The parameters of the Te-MO Aspirate command are as follows:

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

The Te-MO does not support liquid level detection. If you want to use a liquid class for the Te-MO which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 14-7). The Te-MO only uses the emulated liquid level detection for aspiration.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different Te-MO slide and carrier (i.e. labware) for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Volume

Specify the required pipetting volume. The same volume is aspirated by all of the tips. The maximum allowed volume is the plunger or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Specify the required Te-MO slide and carrier position by clicking on the labware in the Worktable Editor. You must first put an appropriate labware item in the Worktable Editor at the required position. The gray (protected) field above the location panel then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the Te-MO pipetting head has less tips than the number of wells in the labware, you must click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your selection will be shown in green.

15.56.2 Te-MO Dispense Command

The Te-MO Dispense command is used to dispense liquid to specified positions on the Te-MO. It is analogous to the Dispense command for the LiHa.

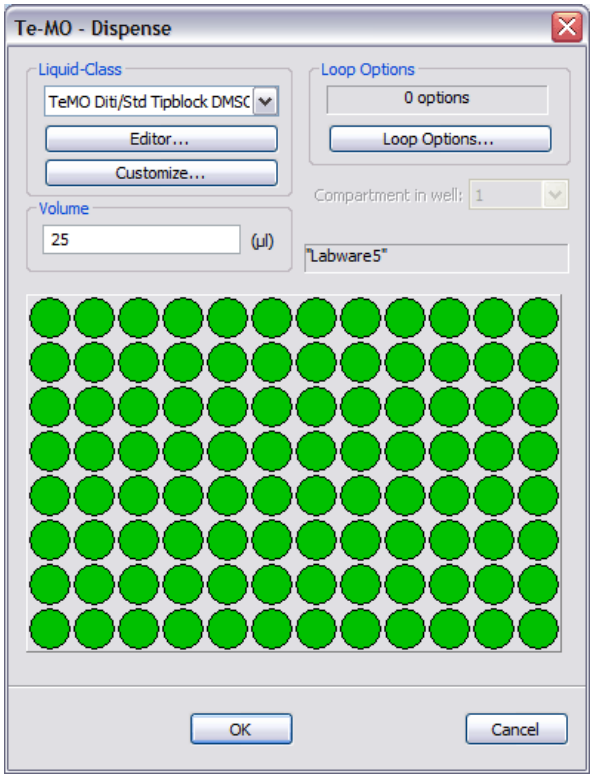

Fig. 15-86 *Te-MO Dispense command*

The parameters of the Te-MO Dispense command are as follows:

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

The Te-MO does not support liquid level detection (or emulated liquid level detection) for dispensing. Accordingly, you cannot use a liquid class which specifies liquid level detection with this command.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different Te-MO slide and carrier (i.e. labware) for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Volume

Specify the required pipetting volume. The same volume is dispensed by all of the tips. The maximum allowed volume is the plunger or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Specify the required Te-MO slide and carrier position by clicking on the labware in the Worktable Editor. You must first put an appropriate labware item in the Worktable Editor at the required position. The gray (protected) field above the location panel then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the Te-MO pipetting head has less tips than the number of wells in the labware, you must click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your selection will be shown in green.

15.56.3 Te-MO Mix Command

The Te-MO Mix command performs a mix operation by aspirating and then dispensing at the same Te-MO position. It is analogous to the Mix command for the LiHa.

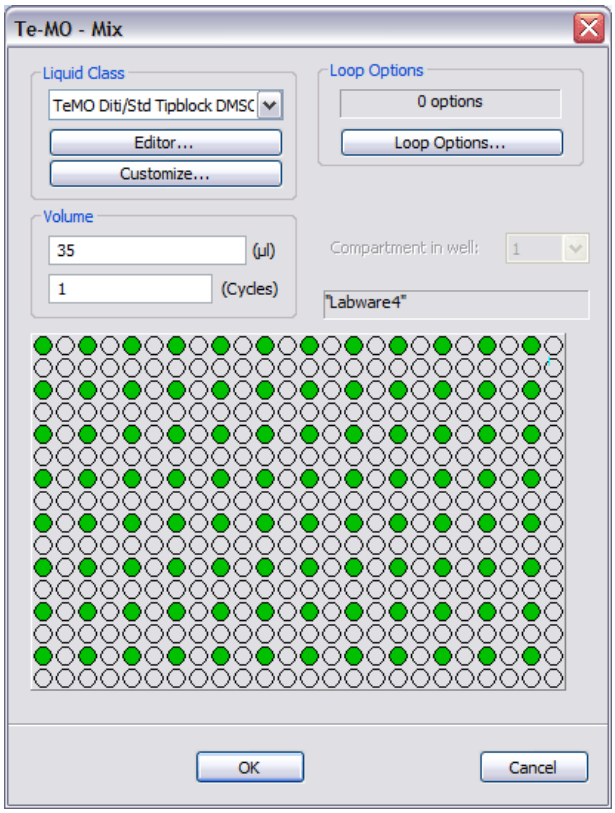

Fig. 15-87 *Te-MO Mix command*

The parameters of the Te-MO Mix command are as follows:

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Aspirate or Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

The Te-MO does not support liquid level detection (or emulated liquid level detection) for mixing. Accordingly, you cannot use a liquid class which specifies liquid level detection with this command.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different Te-MO slide and carrier (i.e. labware) for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Volume

Specify the volume that you want to aspirate for the mixing process. The same volume is pipetted by all of the tips. The maximum allowed volume is the plunger or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Cycles

Specify how often you want to repeat the mixing process.

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Specify the required Te-MO slide and carrier position by clicking on the labware in the Worktable Editor. You must first put an appropriate labware item in the Worktable Editor at the required position. The gray (protected) field above the location panel then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the Te-MO pipetting head has less tips than the number of wells in the labware, you must click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your selection will be shown in green.

15.56.4 Te-MO Wash Command

The Te-MO Wash command is used to wash the Te-MO tips or DITIs using the specified Te-MO 96 wash block, which is designed for 96-tip Te-MO tip blocks and 96-tip DITi pipetting heads and is connected to the Te-MO Wash & Refill Center (WRC) through tubing. The Te-MO hardware supports up to two Te-MO 96 wash blocks.

Use the Te-MO Wash 384 Tip Head command instead if you are using a 384-tip pipetting head.

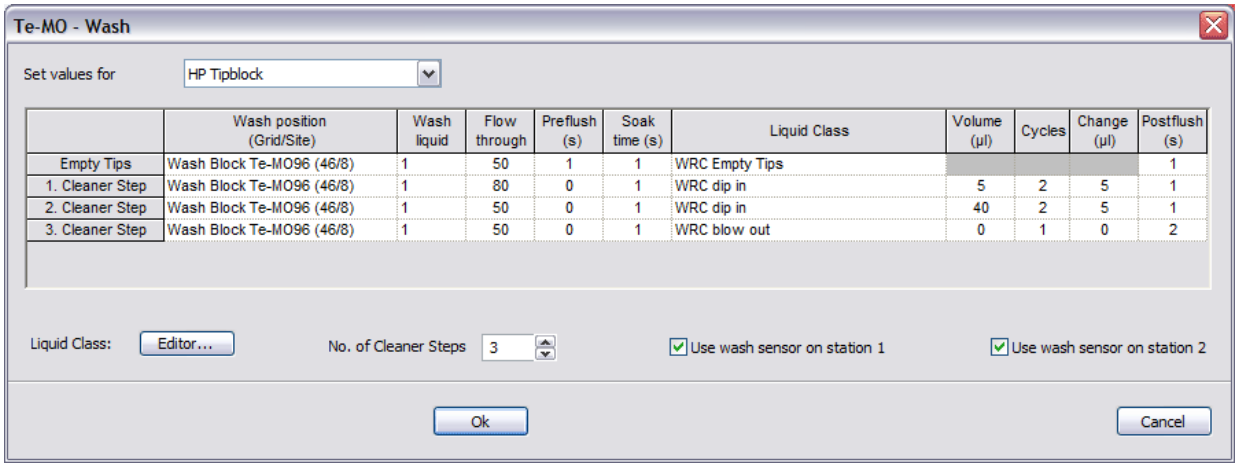
Te-MO - Wash
Set values for
HP Tipblock
Wash position (Grid/Site)
Wash liquid
Flow through
Preflush (s)
Soak time (s)
Liquid Class
Volume (µl)
Cycles
Change (µl)
Postflush (s)
Empty Tips
Wash Block Te-MO96 (46/8) 1 50 1 1 WRC Empty Tips 1
1. Cleaner Step
Wash Block Te-MO96 (46/8) 1 80 0 1 WRC dip in 5 2 5 1
2. Cleaner Step
Wash Block Te-MO96 (46/8) 1 50 0 1 WRC dip in 40 2 5 1
3. Cleaner Step
Wash Block Te-MO96 (46/8) 1 50 0 1 WRC blow out 0 1 0 2
Liquid Class:
Editor...
No. of Cleaner Steps
3
Use wash sensor on station 1
Use wash sensor on station 2
Ok
Cancel

Fig. 15-88 *Te-MO Wash command*

The wash process normally consists of one *Empty Tips* step and one or more *Cleaner* steps. Start by choosing the required number of cleaner steps in the *No. of Cleaner Steps* field.

The parameters and steps of the Te-MO Wash command are as follows:

Set values for

Different wash parameters are needed for each of the Te-MO tip types. Choose the Te-MO tip type you are using from the pull-down list. This configures the Te-MO Wash command with the recommended wash parameters for the chosen tip type.

If you modify the recommended settings after choosing the tip type, the pull-down list will show “Edited values” instead of the tip type you chose.

The parameter sets with the recommended wash parameters are stored in the evoware.inf file (see A.4 “Parameters in the Evoware.inf file”, A-24, Te-MO Wash Parameters). The parameters in the evoware.inf file should only be changed by specialists.

In addition to choosing the tip type in the pull-down list, if you want to wash the whole outside of the tips (the whole length) you may need to adapt the liquid class parameter "Aspiration position, Z-offset" for the liquid class which is used for the first cleaner step (default “Te-MO WRC dip in”) to ensure that the tips dip far enough into the wash liquid. A positive value for Z-offset lowers the tips. Note: You cannot change the properties of the pre-defined (standard) liquid classes. However you can create a new custom class with the same properties and then change them.

Note: *Take care to choose a parameter set to match the tips you are using and to adjust the Z-offset correctly. Incorrect parameters can lead to incomplete washing of the tips, which could cause cross-contamination under unfavorable circumstances.*

Empty Tips step

This step will only be executed if the excess volume or the leading airgap is still in the tips or the Te-MO plunger has not reached the start position.

During this step, the Te-MO head moves to the Z-dispense position above the wash block and any remaining liquid is expelled from the tips.

Cleaner step

During each cleaner step, the Te-MO head moves the tips into the wash block to the Z-max position and waits for the specified soak time. The Te-MO then aspirates and dispenses the specified volume of wash liquid. Specify the *Cycles* parameter to repeat aspiration and dispensing several times if necessary. The WRC washing pumps operate during the entire cleaner step. The Te-MO head moves up and the washing pumps stop at the end of each step.

You can specify the wash liquid (1 or 2) you want to use in the wash block. In addition, the wash block can be flushed for a specified time before starting (Preflush) and after finishing (Postflush) each step.

Wash position

For each of the steps, click on this table field and choose the required wash block from the pull down list. The list shows all Te-MO 96 wash blocks which are currently positioned on the Te-MO in the Worktable Editor (the Te-MO grid position and the wash block site are shown in brackets, see Tab. 8-9 “Te-MO 3x5 site numbers”, 🗎 8-104). The Te-MO hardware supports up to two Te-MO 96 wash blocks. You can only put Te-MO 96 wash blocks on the middle slide of the Te-MO.

Wash liquid

You can connect two different wash liquid containers to the WRC. Specify the wash liquid you want to use in the wash block.

Flow through [%]

Specify the flow rate of the pressure pump of the WRC (range: 1 - 100%; 100% is the maximum flow rate).

Preflush [s]

Specify how long the wash block should be flushed at the beginning of the step (range: 0 -1000 s).

Soak time [s]

Specify how long the tips should soak in the wash block before aspirating and dispensing the wash liquid (range: 0 - 200 s). You must specify at least 1 s for the last Cleaner step.

Liquid Class

Choose the liquid class of the wash liquid from the pull down list. Click the *Editor* button below the table to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 🗎 10-1).

Volume [µl]

Specify the required volume of wash liquid in the cleaner step. The maximum allowed volume is the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity).

Cycles

Specifies how many times aspiration and dispensing of the wash liquid takes place in the cleaner step. If you specify 0, aspiration and dispensing the wash liquid will not be carried out.

Change [µl]

Specify an optional volume of wash liquid which is added to the specified aspiration and dispense volume for each subsequent cycle of the cleaner step. A negative value means that less wash liquid will be used for each subsequent cycle. This parameter can be used to optimize the effectiveness of the washing process. The total volume (*Volume* + *Change*) should not exceed the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Postflush [s]

Specify how long the wash block should be flushed at the end of the step (range: 0 - 1000 s).

Liquid class editor

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1).

Use wash sensor on station 1 / station 2

The Te-MO hardware supports up to two Wash Blocks for the Te-MO 96 pipetting head. Use the checkboxes to switch the wash liquid level detection on or off for the two wash blocks. The wash block sensors should normally be switched on for both wash blocks, but can be disabled e.g. if you are using a wash liquid with a high electrical resistance which cannot be detected reliably.

15.56.5 Te-MO 384 Wash Tip Head Command

The Te-MO can be fitted with a 96-tip or 384-tip pipetting head. In contrast to the Te-MO 96, the Te-MO 384 operates with a system liquid in a similar way to the LiHa, which allows the tips and the entire pipetting head to be flushed from the inside. To do this, the system liquid is pumped into the pipetting head and flows through the tips before being discarded into the Te-MO 384 wash block, which is part of the Te-MO 384 Wash & Refill Center (WRC). Due to its unique design, the Te-MO 384 pipetting head cannot be fitted with DITIs.

The Te-MO Wash 384 Tip Head command is used to wash the Te-MO tips using the specified Te-MO 384 Wash Block. It is designed for 384-tip pipetting heads. The Te-MO hardware only supports one Te-MO 384 Wash Block.

Use the Te-MO Wash command instead if you are using a 96-tip Te-MO tip block or 96-tip DITi pipetting head.

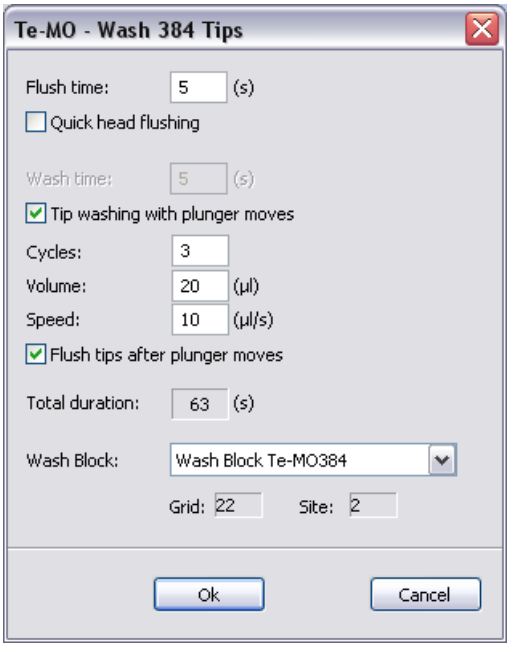

Fig. 15-89 *Te-MO 384 Wash Tip Head command*

The parameters of the Te-MO Wash 384 Tip Head command are as follows:

Flush Time

Specify the required flush time (range: 0.1 - 50 seconds). Flushing takes place with the tips above the Te-MO 384 wash block (tip height = Z-dispense) and moved slightly to the side to position them in between the cleaner tubes. This ensures that the cleaner tubes are not contaminated by the liquid which is expelled during flushing. The specified flush time is preceded by an automated preflush phase with pressure pulses which takes about 15 seconds. The total time required by this step is thus *Flush Time* + 15 s.

Quick head flushing

This option speeds up head flushing by a few seconds. Do not use it for the first wash in the script because a full flush is necessary if you haven't used the Te-MO for some time.

Wash Time

Specify the required wash time (range: 0.1 - 50 seconds). Washing takes place with the tips lowered into cleaning tubes of the Te-MO 384 wash block (tip height = Z-max). This field is inactive (gray) if you specify *Tip washing with plunger moves*.

Tip washing with plunger moves

This option activates an alternative method of washing the tips. It uses plunger movements to aspirate and dispense wash liquid from the wash block. The standard method uses the wash block to pump wash liquid through the pipetting head and the tips but does not move the plunger.
Cycles: Specify how many aspirate/dispense cycles you want (range: 1 to 10).
Volume: Specify the volume of liquid to use for aspirating and dispensing (range: 1 to 50 µl).
Speed: Specify the required aspirating and dispensing speed (range: 1 to 100 µl/s).

Flush tips after plunger moves

This option removes foam from within the tips. Use it if foam is produced during the plunger wash.

Total duration

This field displays the estimated total time required by the wash command based on the settings you have made.

Wash block

Specify the required Te-MO 384 wash block by clicking on the wash block in the Worktable Editor. The Te-MO grid position and the wash block site are then shown in the gray (protected) fields, see also Tab. 8-9 “Te-MO 3x5 site numbers”, 8-104. You must first put an appropriate Te-MO 384 wash block in the Worktable Editor at the required position. Alternatively, choose the Te-MO 384 wash block from the pull down list. The list shows all Te-MO 384 wash blocks which are currently positioned on the Te-MO in the Worktable Editor. You can only put Te-MO 384 wash blocks on the middle slide of the Te-MO. The Te-MO hardware only supports one Te-MO 384 Wash Block.

15.56.6 Te-MO Get DITIs Command

The Te-MO Get DITIs command is used to pick up disposable tips of the specified capacity from a specified position on the Te-MO.

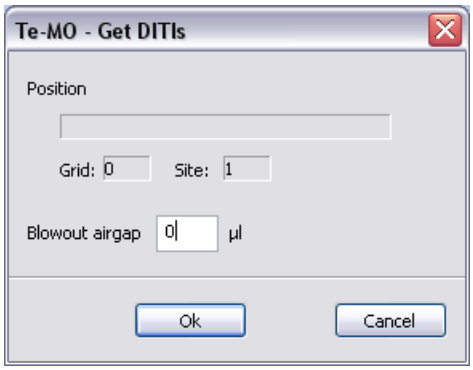

Fig. 15-90 *Te-MO Get DITIs command*

The parameters of the Te-MO Get DITIs command are as follows:

Position

Specify the position where the Te-MO should get the DITIs by clicking on the Te-MO DITI rack in the Worktable Editor. The type or label (name), the Te-MO grid position and the site of the DITI rack are then shown in the gray (protected) fields, see also Tab. 8-9 “Te-MO 3x5 site numbers”, 8-104. You must first put a Te-MO DITI rack in the Worktable Editor at the required position. You can only put Te-MO DITI racks on the middle slide of the Te-MO.

Blowout airgap

Specify the volume of air to aspirate directly before getting the DITIs (range: 0 to 150 µl). When the tips are washed, the air is dispensed at the end of the wash procedure and serves to make sure that all of the wash liquid remaining in the tips is discarded. In contrast to the Leading Airgap (which is specified in the liquid classes), the blowout airgap is only relevant for washing the tips and is not dispensed by the Dispense command.

15.56.7 Te-MO Drop DITIs Command

The Te-MO Drop DITIs command is used to return the disposable tips to a specified position on the Te-MO.

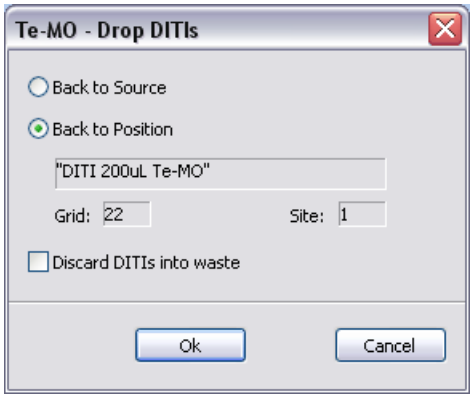

Fig. 15-91 *Te-MO Drop DITIs command*

The parameters of the Te-MO Drop DITIs command are as follows:

Back to source

This option returns the DITIs back to the Te-MO carrier and slide position from where they were fetched with the Te-MO Get DITIs command.

Note: *If you switch off the pipetting instrument with the DITIs still attached, it will forget the Te-MO carrier and slide position from where the DITIs were fetched. The option Back to source will then display an error message when the script is validated.*

Back to position

Specify the position where the Te-MO should return the DITIs by clicking on the Te-MO DITI rack in the Worktable Editor. The type or label (name), the Te-MO grid position and the site of the DITI rack are then shown in the gray (protected) fields, see also Tab. 8-9 “Te-MO 3x5 site numbers”, 8-104. You must first put a Te-MO DITI rack in the Worktable Editor at the required position. You can only put Te-MO DITI racks on the middle slide of the Te-MO.

Discard DITIs into waste

Check this checkbox if you want to discard the DITIs after returning them to the specified position. After putting down the DITIs in the DITI rack, the rack will be pushed into the waste chute. This operation requires the DITI rack to be positioned on the front most site of the centre slide.

15.56.7.1 Side movements when dropping Te-MO DITIs

Under unusual environmental conditions (e.g. very dry ambient air), Te-MO DITIs may not drop reliably due to electrostatic charging of the plastic tips. In such cases, you can specify an optional side and/or vertical movement of the Te-MO pipetting head directly after releasing the tips.

This is done by adding entries to the [TEMO] section of the configuration file evoware.opt using a text editor. evoware.opt is in the <install_path>\Database directory.

Add the following line to move by 10 instrument steps (10 x 0.1 mm) in the X direction:

DITI_SIDE_STEPS_X=10

Add the following line to move by 20 instrument steps in the Y direction:
DITI_SIDE_STEPS_Y=20
Add the following line to move by 15 instrument steps in the Z direction:
DITI_SIDE_STEPS_Z=15

Recommended value for DITI_SIDE_STEPS_X when using this feature: -180
Recommended value for DITI_SIDE_STEPS_Y when using this feature: 0
Recommended value for DITI_SIDE_STEPS_Z when using this feature: 90
To disable this feature, set the values to 0 or remove the entries from the evoware.opt file.
The above settings only affect the Te-MO Drop DITIs command.

***Note:** Freedom EVOware must be re-started for the changes to take effect.*

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing evoware.opt, you will be warned that this file now has an invalid checksum. Confirm the prompt with Yes and proceed as follows to repair the checksum:

- Click Configure in the Toolbar to start the Configuration Tool. You will be warned again that evoware.opt has an invalid checksum and you will be asked if you want to checksum to be repaired. Click Yes. Then Click Exit to return to Freedom EVOware.

15.56.8 Te-MO Get Tip Block Command

The Te-MO Get Tip Block command is used to pick up a tip block from a specified position on the Te-MO.

***Fig. 15-92** Te-MO Get Tip Block command*

The parameters of the Te-MO Get Tip Block command are as follows:

Position

Specify the position where the Te-MO should get the tip block by clicking on the Te-MO tip block in the Worktable Editor. The type or label (name), the Te-MO grid position and the site of the tip block are then shown in the gray (protected) fields, see also Tab. 8-9 “Te-MO 3x5 site numbers”, 8-104. You must first put a Te-MO tip block in the Worktable Editor at the required position. You can only put Te-MO tip blocks on the middle slide of the Te-MO.

Blowout airgap

Specify the volume of air to aspirate directly before getting the tip block (range: 0 to 150 µl). When the tips are washed, the air is dispensed at the end of the wash procedure and serves to make sure that all of the wash liquid remaining in the tips is discarded. In contrast to the Leading Airgap (which is specified in the liquid classes), the blowout airgap is only relevant for washing the tips and is not dispensed by the Dispense command.

15.56.9 Te-MO Drop Tip Block Command

The Te-MO Drop Tip Block command is used to put down the tipblock at a specified position on the Te-MO.

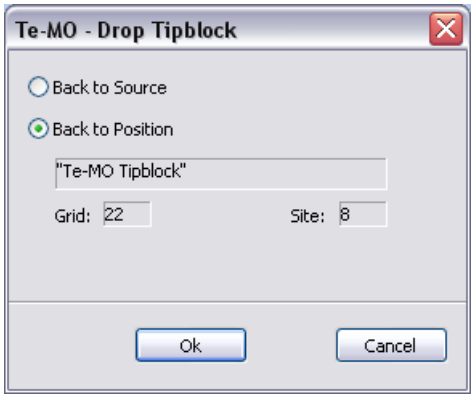

Fig. 15-93 *Te-MO Drop Tip Block command*

The parameters of the Te-MO Drop Tip Block command are as follows:

Back to source

This option returns the tip block back to the Te-MO carrier and slide position from where it was fetched with the Te-MO Get Tip Block command. I:

Note: *If you switch off the pipetting instrument with the tip block still attached, it will forget the Te-MO carrier and slide position from where the tip block was fetched. The option Back to source will then display an error message when the script is validated.*

Back to position

Specify the position where the Te-MO should discard the tip block by clicking on the Te-MO tip block in the Worktable Editor. The type or label (name), the Te-MO grid position and the site of the tip block are then shown in the gray (protected) fields, see also Tab. 8-9 “Te-MO 3x5 site numbers”, 8-104. You must first put a Te-MO tip block in the Worktable Editor at the required position. The gray (protected) field then shows the type or the label (name) of the selected item. You can only put Te-MO tip blocks on the middle slide of the Te-MO.

15.56.10 Te-MO Refill Trough Command

The Te-MO trough is a special carrier on the Te-MO which is used as a container for a reagent liquid. The reagent liquid can be aspirated using the Te-MO pipetting

commands. The Te-MO Refill Trough command is used to refill the trough with reagents.

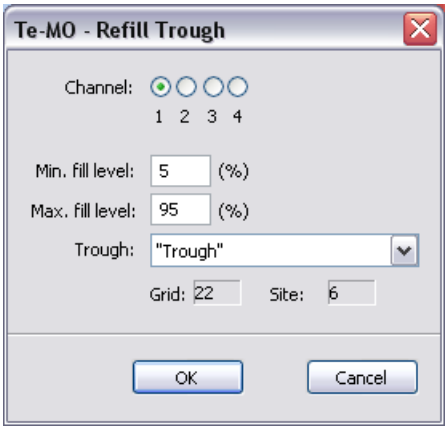

Fig. 15-94 *Te-MO Refill Trough command*

The parameters of the Te-MO Refill Trough command are as follows:

Channel

You can connect up to four different reagent containers to the trough. Specify the channel which contains the reagent you want to use.

Min. fill level

Specify the minimum fill level in %. The trough will only be refilled if the liquid quantity has dropped to this level.

Max fill level

Specify the maximum fill level in %. Refilling of the trough will be stopped when the liquid quantity reaches this level.

Trough

Specify the position of the trough by clicking on the trough in the Worktable Editor. The Te-MO grid position and the site of the trough are then shown in the gray (protected) fields, see also Tab. 8-9 “Te-MO 3x5 site numbers”, 8-104. You must first put an appropriate Te-MO trough in the Worktable Editor at the required position. Alternatively, choose the required trough from the pull down list. The list shows all troughs which are currently positioned on the Te-MO in the Worktable Editor. You can only put Te-MO troughs on the middle slide of the Te-MO.

15.56.11 Te-MO Relative Movements Command

The Te-MO Relative Movements command is used to perform Te-MO movements with an offset. It can be used e.g. to program a serial dilution. It is only available for the Te-MO 96.

The Te-MO (Tecan Multi-Pipetting Option) is normally used to perform pipetting operations on all of the wells of the labware simultaneously, whereby the Te-MO pipetting head is positioned directly above the labware. However, it can also be used to carry out operations such as serial dilution. In this case, pipetting takes place to one column or one row of the labware at a time. This is achieved by only picking up DITIs for a single column or row and positioning the Te-MO head with an offset to align the DITIs with the required wells. For fixed tips, you can use a special tip block which only has tips fitted to one row or column.

For mechanical reasons, the Te-MO head can only be positioned within the working area of the Te-MO. Accordingly, fit the tips to the column on the left side of the head if you want to access all of the columns of the labware on the left slide. Fit the tips to the column on the right side of the head if you want to access all of the columns of the labware on the right slide. If you fit the tips to the front row of the Te-MO head, you can access all rows of the labware on the left or the right slide. Note: The center slide is not normally used for pipetting with relative movements.

To fit DITI tips to the required column or row of the Te-MO head, load tips into only one column or row of the new DITI rack and then use the Te-MO Get DITIs command in the normal way (with an offset of 0). See also Fetching DITIs, below.

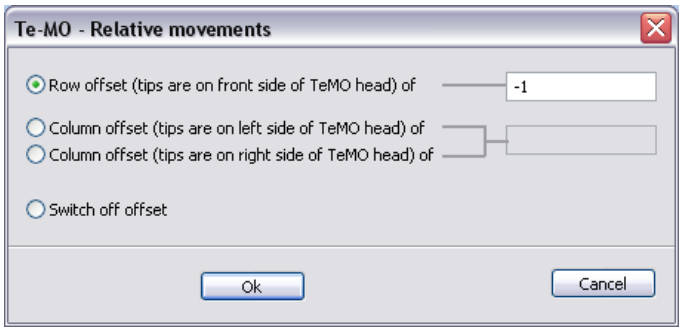
Te-MO - Relative movements
Row offset (tips are on front side of TeMO head) of
-1
Column offset (tips are on left side of TeMO head) of
Column offset (tips are on right side of TeMO head) of
Switch off offset
Ok
Cancel

Fig. 15-95 *Te-MO Relative Movements command*

The parameters of the Te-MO Relative Movements command are as follows:

Row offset (tips are on front side of Te-MO head)

This option is used to pipette to rows of the labware on the left or right slide. Specify the required row offset. Fit the tips on the front row(s) of the Te-MO head. The offset for pipetting to the front row of the labware is 0. The offset for the second row (from front to back) is -1.

Column offset (tips are on left side of Te-MO head)

This option is used to pipette to columns of the labware on the left slide. Specify the required column offset. Fit the tips on the left column(s) of the Te-MO head. The offset for pipetting to the left column of the labware is 0. The offset for the second column (from left to right) is 1.

Column offset (tips are on right side of Te-MO head)

This option is used to pipette to columns of the labware on the right slide. Specify the required column offset. Fit the tips on the right column(s) of the Te-MO head. The offset for pipetting to the left column of the labware is 0. The offset for the second column (from left to right) is 1.

Switch off offset

This cancels a previously specified offset (row or column) and resets the Te-MO pipetting head to the default position. It has the same effect as specifying a column offset of 0 with the option *Column offset (tips are on left side of Te-MO head)*.

You cannot specify a row and a column offset simultaneously. If you specify a row offset, this cancels a previously specified column offset. If you specify a column offset, this cancels a previously specified row offset.

Note: *You must switch off the offset before fetching a tipblock with the Te-MO Get Tipblock command. In addition, it is recommended to switch off the offset when you no longer want to use Te-MO offsets in your script.*

Fetching DITIs

If required, you can specify an offset before fetching the DITIs with the Te-MO Get DITIs command. Use this feature if you do not want to pick up DITIs for all of the rows or columns of the pipetting head. If you use an offset, make sure that the pipetting head will not collide with other objects, e.g. other DITIs in the DITI rack. Please contact Tecan for further information.

15.56.12 Load the Te-MO Command

The Te-MO is normally loaded with labware during script or process runtime using RoMa movement commands. You can also load it manually, before starting the script or process. However, depending on their position in the Te-MO, some of the Te-MO sites may be difficult to access due to the position of the Te-MO slides.

This command is used to move a specified Te-MO site to the RoMa transfer position (also called the exchange position) to make it easier to exchange the labware manually. It is mainly intended for use in maintenance scripts.

For safety reasons, Freedom EVOware does not open the doors of the pipetting instrument when scripts are running. Please use the supplied *Loading the Te-MO* maintenance script if you want to load the Te-MO manually (see 6.4.2 “Run Maintenance”, 6-10).

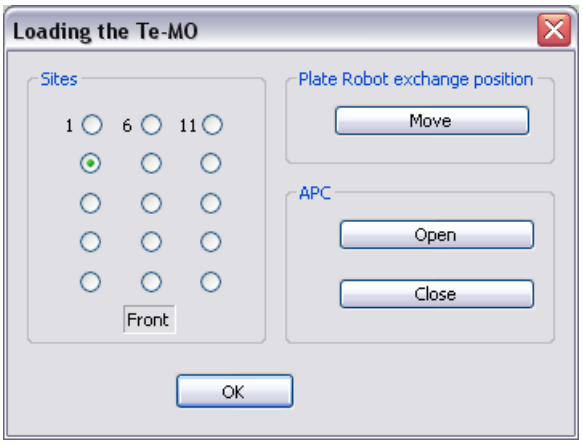

Fig. 15-96 *Loading the Te-MO command*

Choose the required slide and site in the Sites panel and click *Move* in the *Plate Robot exchange position* panel to move the site to the exchange position.

When the Te-MO reaches the plate robot exchange position and you are using an APC (Active Positioning Carrier), click *Open* in the APC panel to release the labware. Click *Close* in the APC panel to lock the labware in position again. You can only release or lock the labware at the exchange position.

The *Loading the Te-MO* dialog box is not available if Freedom EVOware is running in offline mode.

15.56.13 Fill system (Te-MO 384) Command

The Fill system (Te-MO 384) command is used to fill and flush the 384-tip Te-MO pipetting system and to prime the wash block of the Te-MO 384 Wash & Refill Center. It is not applicable to the 96-tip Te-MO tip block or the 96-tip Te-MO DITi

pipetting head. It is mainly intended for use in maintenance scripts (see 6.4.2 “Run Maintenance”, 6-10).

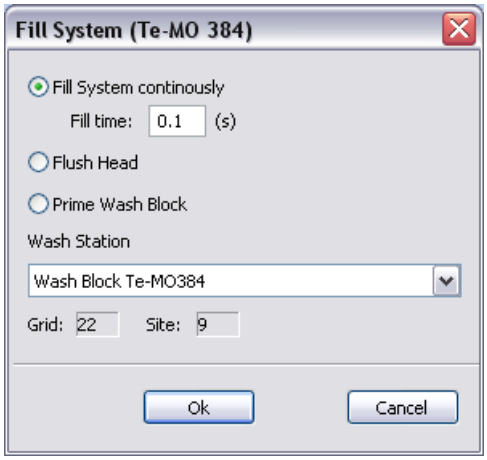

Fig. 15-97 *Fill System (Te-MO 384) dialog box*

The parameters of the Fill System (Te-MO 384) command are as follows:

Fill system continuously

This is used to fill the Te-MO 384 pipetting system with system liquid. This operation is normally only necessary if you fit a new pipetting head.

Fill Time: Specify the required fill time in seconds.

Flush head

This is used to flush the Te-MO 384 pipetting head with system liquid to clean the system and remove trapped air. Flushing should be carried out daily before using the Te-MO 384 for the first time or if several hours have elapsed since the Te-MO 384 was last used. This automated procedure takes about 25 seconds and cannot be interrupted.

Prime wash block

This is used to prime the Te-MO 384 wash block with system liquid (fill the cleaner tubes). Priming should be carried out daily before using the Te-MO 384 wash block for the first time or if several hours have elapsed since the Te-MO 384 wash block was last used.

Wash Block

Specify the position of the Te-MO 384 wash block by clicking on the wash block in the Worktable Editor. The Te-MO grid position and the site of the wash block are then shown in the gray (protected) fields, see also Tab. 8-9 “Te-MO 3x5 site numbers”, 8-104. You must first put an appropriate Te-MO 384 wash block in the Worktable Editor at this position. Alternatively, choose the required Te-MO 384 wash block from the pull down list. The list shows all Te-MO 384 wash blocks which are currently positioned on the Te-MO in the Worktable Editor. You can only put Te-MO 384 wash blocks on the middle slide of the Te-MO.

15.57 Move RoMa Command

This command is used to carry out simple RoMa movements without using a RoMa vector:

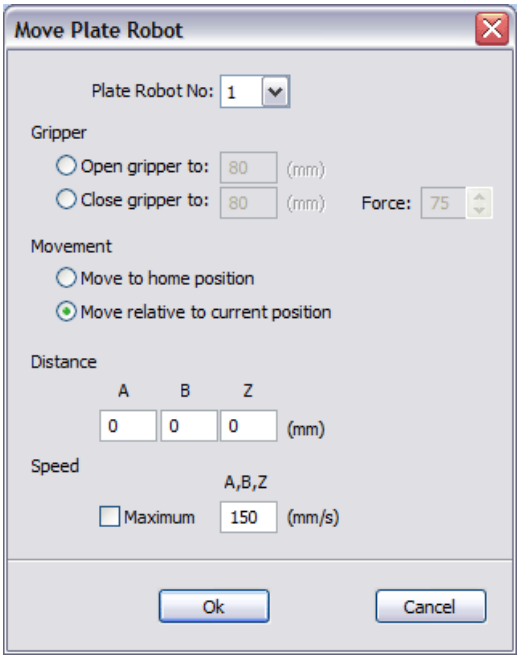

Fig. 15-98 *Move RoMa command*

The parameters of the Move RoMa command are as follows:

ROMA-No.

Choose the RoMa you want to use (1 or 2) if your instrument is fitted with more than one.

Open Gripper

This opens the gripper to the specified width (range: 55 to 140 mm).

Close Gripper

This closes the gripper to the specified width (range: 55 to 140 mm) using the specified force (range: 0 to 249). A Grip Error message will be output if no resistance is detected when gripping.

Move to home position

This moves the RoMa to the specified home position.
After completing a sequence of movements with the RoMa, you should move it back to its home (parking) position, out of the way of other objects on the worktable (see 9.6.4 “Defining the Home Position for a RoMa”, 9-62).

Move relative to current position

This moves the RoMa relative to its current position. You must then specify the relative distances (range: -400 to 400 mm) and whether the RoMa should move at a particular speed (range: 0.1 to 400 mm/s) or at maximum speed.

The movements in A and B are not aligned with the instrument axes, but with the current rotator position (angle).

The movement in A is perpendicular to the gripper. Example #1: If the gripper points to the front (angle = 0°) and the A value is positive, then the RoMA will move to the left. Example #2: If the gripper points to the left (angle = 90°) and the A value is positive, then the RoMA will move to the back.

The movement in B is in line with the gripper. Example #1: If the gripper points to the front (angle = 0°) and the B value is positive, then the RoMA will move to the front. Example #2: If the gripper points to the left (angle = 90°) and the B value is positive, then the RoMA will move to the left.

See also 9.4.8.2 “RoMa Coordinate System”, 9-39.

15.58 RoMa Vector Command

This command executes a RoMa vector, which is a predefined sequence of RoMa movements. You can also specify gripper actions at the Safe and End positions. See 9.6.1 “Using RoMa Vectors”, 9-58 for more information.

The RoMa Vector command is intended for special RoMa movements and not for moving labware from one position to another - you should use the Transfer Labware command instead for this purpose. See also 15.58.1 “Moving labware with the RoMa Vector command”, 15-142.

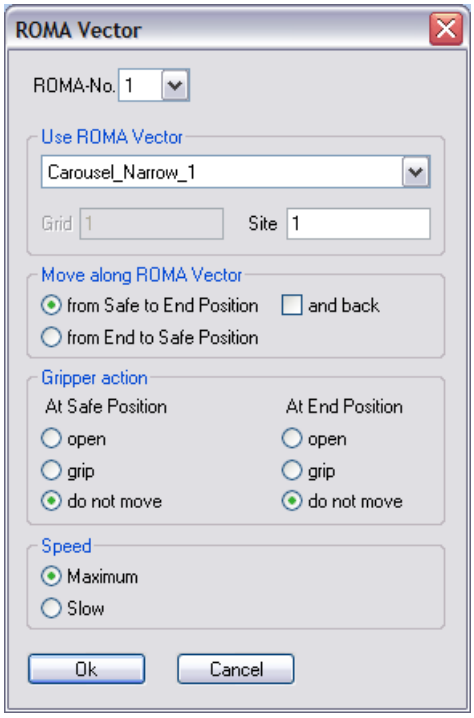

Fig. 15-99 *RoMa Vector command*

The parameters of the RoMa Vector command are as follows:

RoMa-No.

Choose the RoMa you want to use (1 or 2) if your instrument is fitted with more than one.

Use RoMa Vector

Choose the RoMa vector you want to use for the RoMa movement. The popup list shows the RoMa vectors which are currently defined in the Freedom EVOware database.

The digit at the end of the vector name (e.g. Carousel_Narrow_1) indicates the RoMa for which the vector was defined (1 or 2). See also 9.6.1 “Using RoMa Vectors”, 9-58.

You can also choose a user-defined vector. User-defined vectors are created in the Control Bar (Robot Vectors section).

Then specify the grid position and carrier site for which the vector is intended. The Grid field is protected (gray) if you have chosen a vector for a device which is not positioned on the worktable (see Carrier is Device checkbox in the carrier definition).

Tip: If you click on a carrier, the current grid position is shown in the small yellow tab at the bottom left.

Move along RoMa Vector

Choose the required direction of the RoMa movement. Click *And back* if you want the RoMa to return to the Safe position after reaching the End position.

Gripper action

Choose the gripper action which should be executed at the Safe position and at the End position. The required gripper spacing to pick up and release the labware is taken from the Grip Width and Release Width parameters in the chosen RoMa vector.

Speed

Choose *Maximum* if you want the RoMa to move at maximum speed. Choose *Slow* if you want the RoMa to move at the speed specified in the RoMa vector.

15.58.1 Moving labware with the RoMa Vector command

If you have scanned the labware barcode and you move the labware with the Transfer Labware command, the barcode remains assigned to the labware (i.e. the labware data record) at the new location. In addition, pipetting information, if any, remains assigned to the labware (see 15.26 “Export Data Command”, 15-48).

This is not the case with the RoMa Vector command. The barcode and the pipetting information are no longer available at the new location.

This also applies analogously to the MCA96 Vector command and the MCA384 Vector command.

Proceed as follows if you want to use a Vector command to move barcoded labware in special situations:

- After scanning the barcode, assign it to a temporary variable (see 14.1.11 “Labware Attributes and String Variables”, 14-16).
- Move the labware.
- Re-assign the barcode from the temporary variable to the labware.

This workaround transfers the barcode but not the pipetting information.

15.59 Transfer Labware Command

This command is used to transfer labware (e.g. a microplate) from one position to another with the plate robot (RoMa).

If you have scanned the labware barcode and you move the labware with the Transfer Labware command, the barcode remains assigned to the labware (i.e. the labware data record) at the new location. In addition, pipetting information, if any, remains assigned to the labware (see 15.26 “Export Data Command”, 15-48).

Grip and release commands for the RoMa (used to pick up and put down the labware) are handled automatically. The required gripper spacing is taken from the advanced properties for the respective labware type (see 9.4.2 “Editing Labware, Advanced Tab”, 9-22):

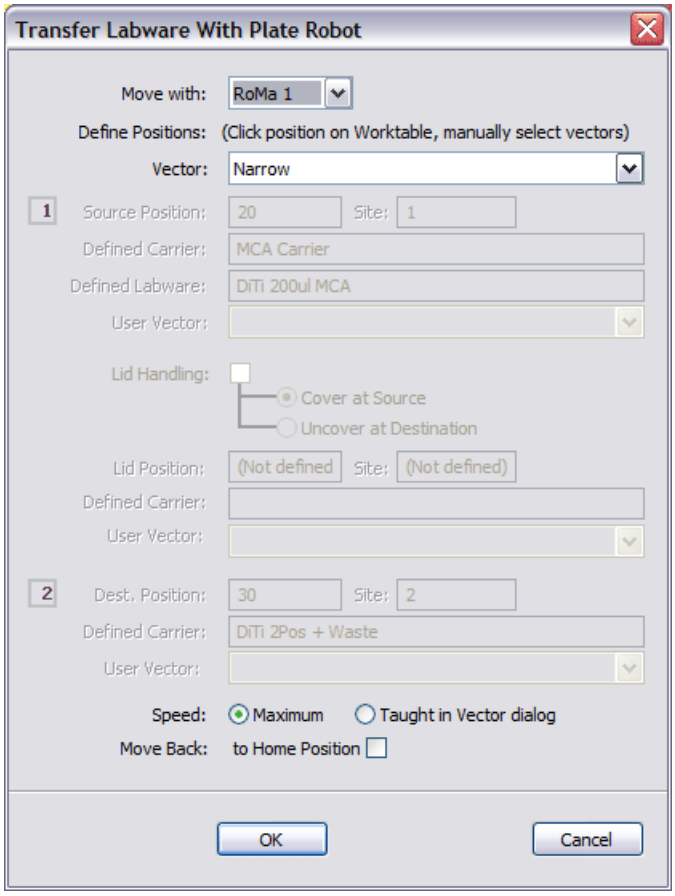

Fig. 15-100 *Transfer Labware command*

The parameters of the Transfer Labware command are as follows:

Move with

Choose the RoMa you want to use (1 or 2) if your instrument is fitted with more than one.

Vector

Choose the RoMa vector that you want to use to pick up the labware.

Choose Narrow to pick up the labware on the narrow side; choose Wide to pick up the labware on the wide side.

Choose User defined (Narrow) or (Wide) to pick up the labware on the narrow or wide side with a **user-defined vector**. In this case, you must choose the user-defined vector to use for picking up the labware at the source position and putting down it at the destination position in the two *User Vector* pull-down lists. User-defined vectors are created in the Control Bar (Robot Vectors section). See 5.4.1.6 “Robot Vectors”, 🗎 5-12.

Above all if you did not create the user-defined vector yourself, we recommend you to check carefully that the vector moves the RoMa to the correct (i.e. intended) source and destination carrier positions before using it for pipetting. Tip: Test the RoMa vector in a script using the 3D simulation program EVOSim.

Freedom EVOware will report an error when you complete the Transfer Labware command if the narrow or wide RoMa vector has not yet been created for the chosen labware type. It is best to create the required RoMa vectors in advance (see 9.6.2 “Teach Plate Robot Vector Dialog Box”, 🗎 9-59).

⌦ Transfer Labware command, Step 1

Specify the parameters for the source position:

Source position

Select the current position of the labware by clicking on it in the Worktable Editor.

Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site and the gray (protected) field *Defined Labware* shows the type of labware at the chosen site.

If you want to fetch the labware from a device such as a hotel or barcode scanner, click on the device icon. You then need to choose the site and the labware type. The list shows labware types which are allowed for the device (see 9.5 “Configuring Carriers”, 🗎 9-39, “Allowed Labware on this carrier”).

⌦ Transfer Labware command, Step 2

Specify the parameters for the labware lid. These parameters are only available for labware types which can be fitted with a lid:

Lid handling

Check this checkbox if the labware has a lid. Choose *Cover at source* if you want to put on the lid before moving the labware. Choose *Uncover at destination* if you want to remove the lid after moving the labware to the destination position (i.e. the lid was already present). In either case, select the position for fetching or putting aside the lid by clicking on the site in the Worktable Editor. Grid and Site then show the position you have chosen. The gray (protected) field Defined Carrier shows the type of carrier on which the lid is placed/will be placed. You can only put aside lids on unused carrier sites.

⌦ Transfer Labware command, Step 3

Specify the parameters for the destination position:

Destination Position

Select the required destination position of the labware by clicking on the site in the Worktable Editor.

The destination site must be suitable for the labware type you are moving (see 9.5 “Configuring Carriers”, 9-39, “Allowed labware on this carrier”).

Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site.

If you want to move the labware to a device such as a hotel or barcode scanner, click on the device icon. You then need to choose the site and the labware type. The list shows labware types which are allowed for the device (see 9.5 “Configuring Carriers”, 9-39, “Allowed Labware on this carrier”).

Speed

Choose *Maximum* if you want the RoMa to move at maximum speed. Choose *Taught in vector dialog* if you want the RoMa to move at the speed specified in the RoMa vector.

Move back to Home Position

Check this checkbox if you want the RoMa to move back to its home (parking) position after transferring the labware. See 9.6.4 “Defining the Home Position for a RoMa”, 9-62.

15.60 Move PnP Command

This command is used to carry out simple PnP movements without using a PnP vector:

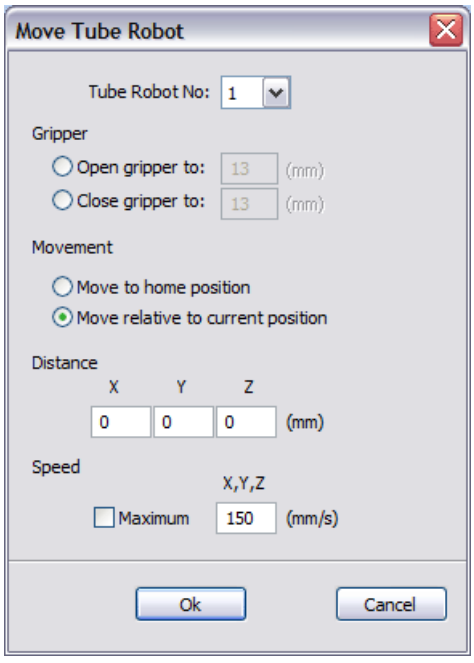

Fig. 15-101 *Move PnP command*

The parameters of the Move PnP command are as follows:

PnP-No.

Choose the PnP you want to use (1 or 2) if your instrument is fitted with more than one.

Open Gripper

This opens the gripper to the specified width (range: 7 to 28 mm).

Close Gripper

This closes the gripper to the specified width (range: 7 to 28 mm) using the specified force (range: 0 to 249). A Grip Error message is output if no resistance is detected when gripping.

Move to home position

This moves the PnP to the specified home position.
After completing a sequence of movements with the PnP, you should move it back to its home (parking) position, out of the way of other objects on the worktable (see 9.7.4 “Defining the Home Position for a PnP”, 9-69).

Move relative to current position

This moves the PnP relative to its current position. You must then specify the relative distances (range: -400 to 400 mm) and whether the PnP should move at a particular speed (range: 0.1 to 400 mm/s) or at maximum speed.

15.61 PnP Vector Command

This command executes a PnP vector, which is a predefined sequence of PnP movements. You can also specify gripper actions at the Safe and End positions. See 9.7.1 “Using PnP Vectors”, 9-65 for more information.

The PnP Vector command is intended for special PnP movements and not for moving tubes from one position to another - you should use the Transfer Tube command instead for this purpose. See also 15.61.1 “Moving tubes with the PnP Vector command”, 15-148.

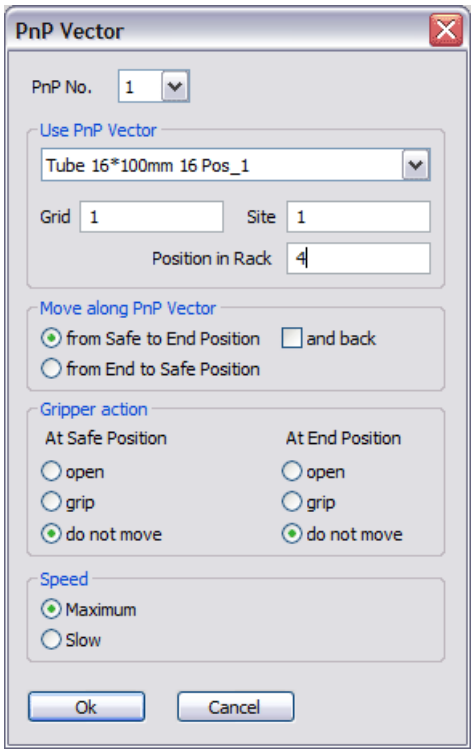

Fig. 15-102 *PnP Vector command*

The parameters of the PnP Vector command are as follows:

PnP-No.

Choose the PnP you want to use (1 or 2) if your instrument is fitted with more than one.

Use PnP Vector

Choose the PnP vector you want to use for the PnP movement. The popup list shows the PnP vectors which are currently defined in the Freedom EVOware database.

The digit at the end of the vector name (e.g. Tube 16*100mm 16 Pos_1) indicates the PnP for which the vector was defined (1 or 2). See also 9.7.1 “Using PnP Vectors”, 9-65.

Then specify the grid position, the carrier site and the tube position for which the vector is intended.

Tip: If you click on carrier, the current grid position is shown in the small yellow tab at the bottom left.

Move along PnP Vector

Choose the required direction of the PnP movement. Click *And back* if you want the PnP to return to the Safe position after reaching the End position.

Gripper action

Choose the gripper action which should be executed at the Safe position and at the End position. The required gripper spacing to pick up and release the tube is taken from the Grip Distance and Release Distance parameters in the chosen PnP vector.

Speed

Choose *Maximum* if you want the PnP to move at maximum speed. Choose *Slow* if you want the PnP to move at the speed specified in the PnP vector.

15.61.1 Moving tubes with the PnP Vector command

If you have scanned the tube barcode and you move the tube with the Transfer Tube command, the barcode remains assigned to the tube (i.e. the tube data record) at the new location. In addition, pipetting information, if any, remains assigned to the tube (see 15.26 “Export Data Command”, 15-48).

This is not the case with the PnP Vector command. The barcode and the pipetting information are no longer available at the new location.

Proceed as follows if you want to use the PnP Vector command to move barcoded tubes in special situations:

- After scanning the barcode, assign it to a temporary variable (see 14.1.11 “Labware Attributes and String Variables”, 14-16).
- Move the tube.
- Re-assign the barcode from the temporary variable to the tube.
  This workaround transfers the barcode but not the pipetting information.

15.62 Transfer Tube Command

This command is used to transfer a tube from one position to another with the tube robot (PnP).

If you have scanned the tube barcode and you move the tube with the Transfer Tube command, the barcode remains assigned to the tube (i.e. the tube data record) at the new location. In addition, pipetting information, if any, remains assigned to the tube (see 15.26 “Export Data Command”, 15-48).

You do not need to specify a PnP vector with this command because each labware type (e.g. tube rack) is associated with only one PnP vector for each PnP arm, so there is no choice to make.

Grip and release commands for the PnP (to pick up and put down the tube) are handled automatically. The required gripper spacing is taken from the Grip Distance and Release Distance parameters in the PnP vector for the selected labware type.

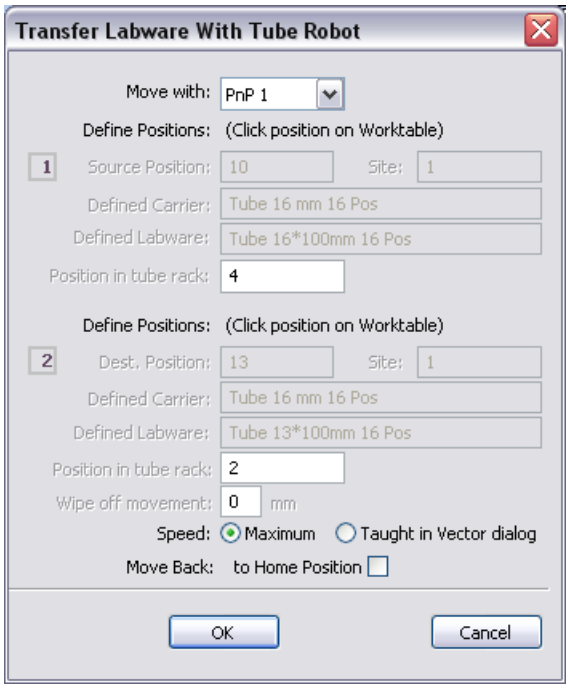

Fig. 15-103 *Transfer Tube command*

The parameters of the Transfer Tube command are as follows:

Move with

Choose the PnP you want to use (1 or 2) if your instrument is fitted with more than one.

The Transfer Tube command will use the PnP vector (PnP movement command) which is associated with the chosen tube type. Freedom EVOware will report an error when you complete the Transfer Tube command if a PnP vector has not yet been created for this tube type. It is best to create the required PnP vector in advance (see 9.7.2 “Teach Tube Robot Vector Dialog Box”, 9-65).

⌦ Transfer Tube command, Step 1

Specify the parameters for the source position:

Source position

Select the position of the source tube rack by clicking on it in the Worktable Editor. Grid and Site then show the position you have chosen. The gray (protected) field Defined Carrier shows the type of carrier at the chosen site. The gray (protected) field *Defined Labware* then shows the type of labware at the chosen site.

Position in tube rack

Specify the current position of the tube in the source tube rack. Freedom EVOware counts tubes from rear to front and then from left to right.

⌦ Transfer Tube command, Step 2

Specify the parameters for the destination position:

Destination Position

Select the position of the destination tube rack by clicking on the site in the Worktable Editor. Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site.

Position in tube rack

Specify the required position of the tube in the destination tube rack. Freedom EVOware counts tubes from rear to front and then from left to right.

Wipe off movement

If the tubes you use carry adhesive labels, in unusual cases they may stick to the PnP fingers due to incorrectly applied labels or adhesive residues. In such cases, you can activate an optional downwards movement of the PnP directly after releasing the tube. Specify the required downwards movement in mm (range: 0 to 10 mm).

Speed

Choose *Maximum* if you want the PnP to move at maximum speed. Choose *Taught in vector dialog* if you want the PnP to move at the speed specified in the PnP vector.

Move back to Home Position

Check this checkbox if you want the PnP to move back to its home (parking) position after transferring the tube. See 9.7.4 “Defining the Home Position for a PnP”, 9-69.

15.63 PosID Command

The PosID command is used to read the barcode labels on one or more pieces of labware using the PosID option. The corresponding carrier or tube rack barcodes will also be scanned.

The PosID (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. Unlike fixed barcode scanners, it does not need a robot to bring the labware to it. The PosID is installed at the rear of the pipetting instrument and is provided with a gripper which pulls the carrier towards the rear for barcode identification and then slides the carrier back into the pipetting position. The scanning head hinges to read barcodes which are attached to horizontal or vertical surfaces. Barcodes can be read on both the primary side (e.g. sample tube) and the secondary side (e.g. microplates).

Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.26 “Export Data Command”, 15-48).

The Scan tab lets you choose the labware you want to scan and the Barcode types tab is used to configure the barcode types which the PosID scanner will accept for the chosen labware:

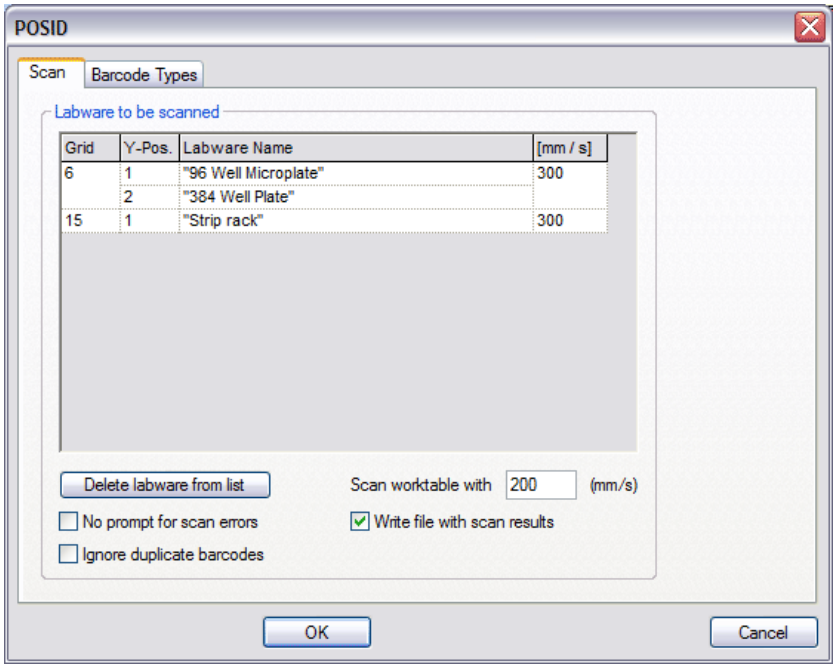

Fig. 15-104 *PosID command (Scan tab)*

The parameters of the PosID command are as follows (Scan tab):

Labware to be scanned

This shows the labware which Freedom EVOware will scan with this command. Click on a labware item in the Worktable Editor to add it to the list. If necessary, adjust the speed with which the labware barcode should be scanned (range 30 to 400 mm/s). The corresponding carrier or tube rack barcodes will also be scanned and do not need to be specified.

Delete labware from list

To remove labware from the list, select the corresponding line and click this button.

Scan worktable with

Specify the speed with which the carrier or tube rack barcodes should be scanned (range: 30 to 300 mm/s). Choose slower speeds if the barcodes are difficult to read or very small and to prevent spilling of the liquid in the wells as the scanner carrier is positioned.

No prompt for scan errors

If this option is enabled, Freedom EVOware does not display an error message if a barcode could not be read.

If the carrier barcode cannot be read, the tubes or labware on this carrier won't be scanned either and are assigned default barcodes. The default barcode for labware is the grid position followed by an underscore (_) and the site number. The default barcode for tubes is the grid position followed by an underscore (_) and the tube number.

The default barcode for carriers or tube racks is the carrier code followed by an underscore (_) and the grid position. The grid position is padded to 6 digits with leading zeros. The carrier code is a 3-digit code which indicates the carrier type. Example: 013_000015.

If the carrier barcode can be read but a tube barcode cannot be read, Freedom EVOware assigns a default barcode which consists of three stars (***). If the tube is missing, Freedom EVOware assigns a default barcode which consists of $$$.

Ignore duplicate barcodes

Freedom EVOware will display an error message if the barcode scanner finds the same barcode on two different carriers or labware items.

Check the *Ignore duplicate barcodes* checkbox to switch off this security feature and disable the error message.

Write file with scan results

If this option is enabled, a report file is created with the scanned barcodes. The filename is scan.csv and it is written to the configured Output directory (default path <install_path>\Output). Existing files with the same name are overwritten. The file contains one line per scanned labware or tube barcode.

For information on the sytax of this file see A.2.2 “Barcode file written by the PosID and PosID-3 commands”, A-13.

15.63.1 PosID Command (Barcode Types Tab)

The Barcode Types tab of the PosID command is used to configure the barcode types which the PosID scanner will accept for the chosen labware:

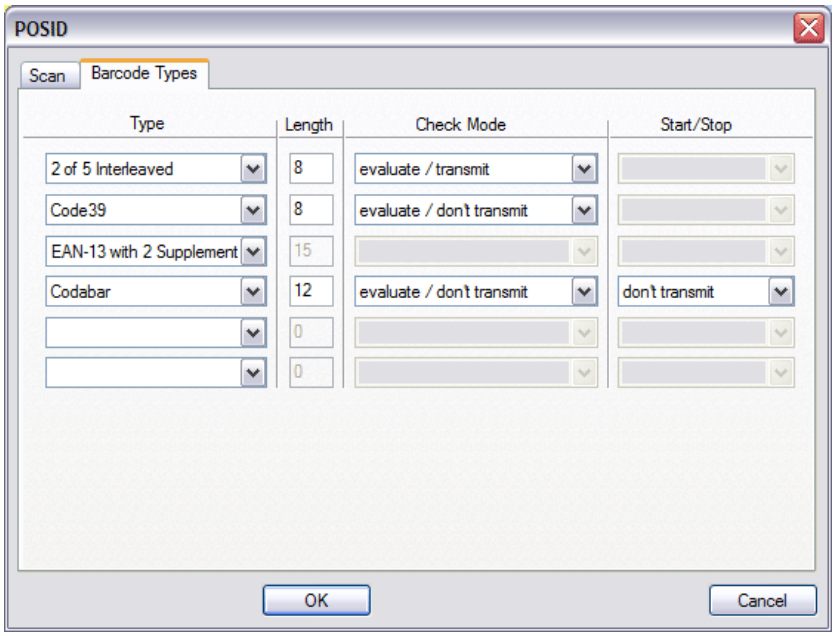

Fig. 15-105 *PosID command (Barcode types tab)*

The parameters of the PosID command are as follows (Barcode Types tab):

Type

Choose the barcodes types which will be accepted by the PosID scanner from the popup lists. You should only choose the barcode types which are being used on the barcode labels. This makes it easier for the scanner to identify incorrect barcodes. The PosID will report an error if it finds a barcode type which you have not chosen.

Some of the barcode types have additional settings as follows:

Length

0	Do not check the length of the barcode.
1..30	The length of the barcode must match this value (the checksum and start/stop code are also counted). Barcodes with different lengths will be ignored.

Check Mode

empty	Do not check the checksum.
evaluate / transmit	The checksum is checked and is reported to Freedom EVOware as part of the barcode.
evaluate / don't transmit	The checksum is checked but not reported.

Start/Stop

empty	A start/stop code is not required.
transmit	A start/stop code is required and is reported to Freedom EVOware as part of the barcode.
don't transmit	A start/stop code is required but not reported.

15.64 Waterbath Control Command

The Waterbath Control command is used to control the Lauda waterbath for the Te-Flow option. The Te-Flow option provides support for the In Situ Hybridization method.

Fig. 15-106 *Waterbath Control command*

The Te-Flow option uses a water circulation system to maintain a constant temperature in the flow through chambers that contain the labware. The water temperature is controlled using a waterbath.

The parameters of the Waterbath Control command are as follows:

Bath

If the instrument is fitted with more than one waterbath, choose the required waterbath from the pull-down list.

Set Temperature

This option switches on the heater and/or cooling system. You must also specify the required temperature (range: -100 to 100 C°).

Switch bath to standby

This option switches the waterbath from normal mode to standby mode. In standby mode, the energy consumption is reduced and the equipment noise level is lower.

Restart bath

This option switches the waterbath from standby mode to normal mode. After reaching normal mode, several minutes may be required before the water circulation system can achieve the specified constant temperature again. In addition, you should also consider the thermal inertia of your equipment.

15.65 Balance Command

The Balance command is used to read a weight from a Mettler balance and store it in a variable.

See 10.1.1 “Global Parameters for Liquid Classes”, 10-4, Liquid Arrival Check panel, for information on pooling balances such as the Mettler WM. You do not need to add a Balance command to your pipetting script to use the Liquid Arrival Check feature.

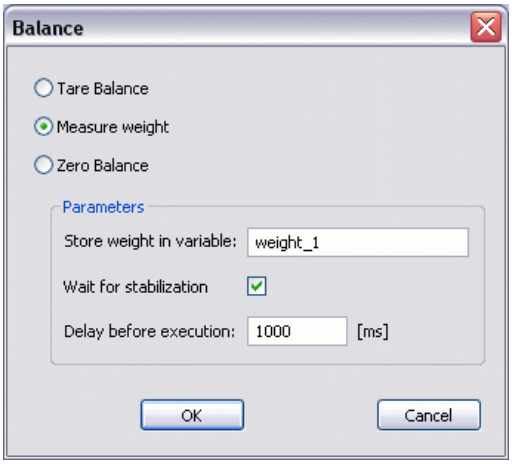

Fig. 15-107 *Balance command*

The parameters of the Balance command are as follows:

Tare Balance

Choose this option to tare the balance. This can be used to make a differential weight measurement, e.g.:

- Put the labware on the balance.
- Tare the balance; if required, you can copy the intermediate weight value to a script variable.
- Dispense the sample onto the labware.

– Read the weight using a second balance command. The measured value does not include the weight of the labware.

The Tare Balance option must not be used if the second weight measurement is less than the first weight measurement (resulting in a negative weight difference). This is the case if you are aspirating. In this case, use the Zero Balance option instead.

When using the Tare Balance option, be careful not to overload the balance. For example, if the balance is rated for 500 g and you tare the balance with an object which weighs 300 g, you can only load the balance with an additional 200 g.

Measure weight

Choose this option to read a weight from the balance.

Zero balance

Choose this option to reset the balance to 0. This can be used to make a differential weight measurement, as described in Tare Balance, above. The Zero Balance option does not let you copy the intermediate weight value to a script variable. In addition, you cannot select “Wait for stabilization”.

When using the Zero Balance option, be careful not to overload the balance. For example, if the balance is rated for 500 g and you tare the balance with an object which weighs 300 g, you can only load the balance with an additional 200 g.

Store weight in variable

Specify the name of the variable you want to use to store the weight value.

Wait for stabilization

This activates the built-in stabilization algorithms in the balance firmware. The balance waits until the measured weight is stable. This can result in a more accurate weight measurement. However, the time required to get a measurement is slightly increased.

Delay before execution

Specify how long to wait before measuring the weight (default: 1000 ms). The delay you specify is in addition to the built-in stabilization delay of the balance and allows more time for mechanical stabilization if necessary.

15.66 Balance Send Command Command

The Balance Send Command allows you to send a firmware command directly to the Mettler balance. For example, you can use it to activate special hardware features and/or options. This command is only intended for specialists.

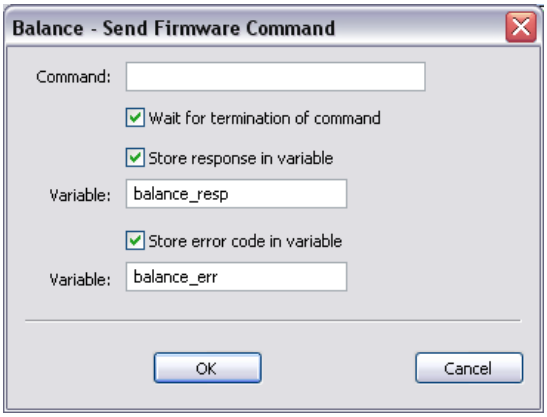

Fig. 15-108 *Balance Send Command command*

The parameters of the Balance Send Command command are as follows:

Command

Specify the firmware command you want to send to the balance. See the respective hardware manual for a list of firmware commands. Firmware commands are nearly always written uppercase.

Wait for termination of command

If you check this checkbox, the pipetting script will wait for the firmware command to finish before continuing; otherwise the pipetting script will be continued immediately.

Store response in variable

Some firmware commands terminate with a return parameter (string or numeric value). Check this checkbox if you want to store the return parameter in a variable. See the respective hardware manual for information on return parameters from firmware commands.

Variable: Specify the name of the variable you want to use.

Store error code in variable

All firmware commands terminate with an error code.The error code is 0 if the command was executed with no errors. Check this checkbox if you want to store the error code in a variable.

Variable: Specify the name of the variable you want to use.

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can result in a malfunction of the balance or cause damage to the hardware.

15.67 Send Command Command

The Send Command command allows you to send a firmware command directly to the pipetting instrument. This command is only intended for specialists.

Fig. 15-109 *Send Command command*

The parameters of the Send Command command are as follows:

Command

Specify the firmware command you want to send to the instrument. For example, “A1RPZ0” returns the current Z position of each of the LiHa tips. See the respective instrument manual for a list of firmware commands. Firmware commands are nearly always written uppercase.

Wait for termination of command

If you check this checkbox, the pipetting script will wait for the firmware command to finish before continuing; otherwise the pipetting script will be continued immediately.

Store response in variable

Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. Check this checkbox if you want to store one of the return codes in a variable. See the respective instrument manual for information on return parameters from firmware commands.

Parameter: Specify which one of the return parameters you want to store.

Variable: Specify the name of the variable you want to use.

Store error code in variable

All firmware commands terminate with an error code.The error code is 0 if the command was executed with no errors. Check this checkbox if you want to store the error code in a variable.

Variable: Specify the name of the variable you want to use.

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

15.68 MCA96 Commands

The MCA96 (Multi Channel Arm 96) is a special liquid handling arm which is fitted with a 96-tip pipetting head. The pipetting head can be fitted with a tipblock (a replaceable block with 96 tips) or with DITIs. The spacing between the tips is fixed (9 mm).

The MCA96 can be optionally fitted with gripper fingers to allow it to pick up and move labware. In contrast to the RoMa, the gripper fingers cannot be rotated (they are always parallel to the X axis of the pipetting instrument).

The MCA96 has important performance advantages when pipetting to a large number of wells simultaneously. For mechanical reasons, the same volume is pipetted by all of the tips.

For mechanical reasons, the MCA96 tipblock, DiTi rack, trough and wash block can only be used on the carrier type “MCA96 Carrier”. These four labware types cannot be used on other carrier types.

Freedom EVOware is provided with special liquid classes which should be used for pipetting with the MCA96.

15.68.1 MCA96 Aspirate Command

The MCA96 Aspirate command is used to pick up liquid from specified positions on the worktable of the pipetting instrument using the multi channel arm.

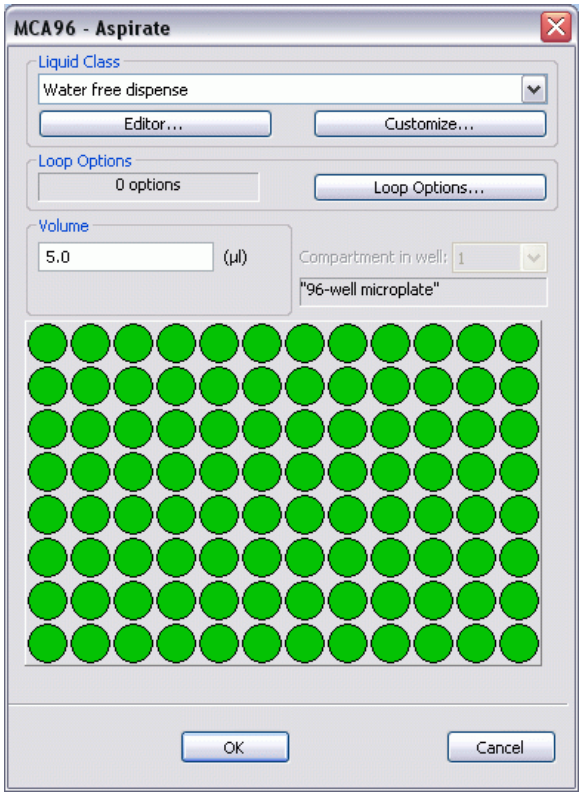

Fig. 15-110 *MCA96 Aspirate command*

The parameters of the MCA96 Aspirate command are as follows:

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

The MCA96 does not support liquid level detection. If you want to use a liquid class for the MCA96 which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 14-7). The MCA96 only uses the emulated liquid level detection for aspiration.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Volume

Specify the required pipetting volume. The same volume is aspirated by all of the tips. The maximum allowed volume is the plunger or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Specify the required labware by clicking on the labware in the Worktable Editor. You must first put an appropriate labware item in the Worktable Editor at the required position. The gray (protected) field above the location panel then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the MCA96 pipetting head has less tips than the number of wells in the labware, you must click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your selection will be shown in green.

15.68.2 MCA96 Dispense Command

The MCA96 Dispense command is used to dispense liquid to specified positions on the worktable of the pipetting instrument using the multi channel arm.

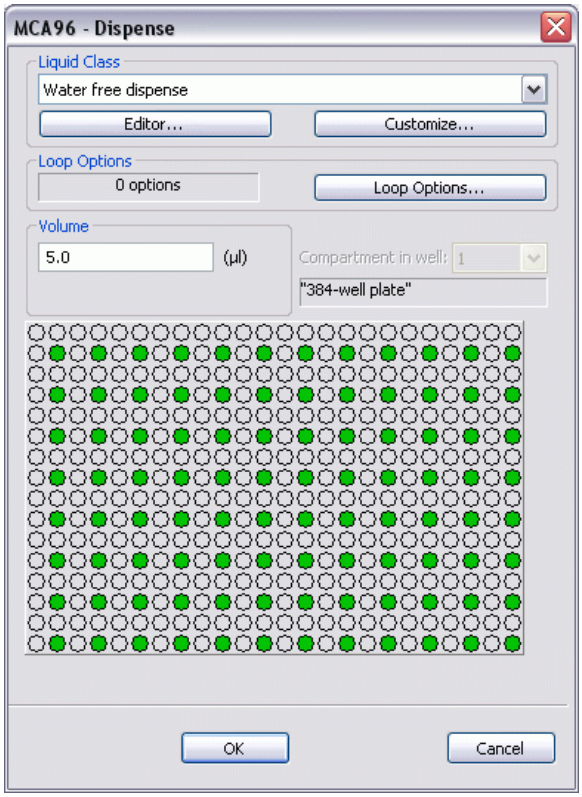

Fig. 15-111 *MCA96 Dispense command*

The parameters of the MCA96 Dispense command are as follows:

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

The MCA96 does not support liquid level detection (or emulated liquid level detection) for dispensing. Accordingly, you cannot use a liquid class which specifies liquid level detection with this command.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Volume

Specify the required pipetting volume. The same volume is dispensed by all of the tips. The maximum allowed volume is the plunger or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Specify the required labware by clicking on the labware in the Worktable Editor. You must first put an appropriate labware item in the Worktable Editor at the required position. The gray (protected) field above the location panel then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the MCA96 pipetting head has less tips than the number of wells in the labware, you must click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your selection will be shown in green.

15.68.3 MCA96 Mix Command

The MCA96 Mix command performs a mix operation by aspirating and then dispensing at the same position using the multi channel arm.

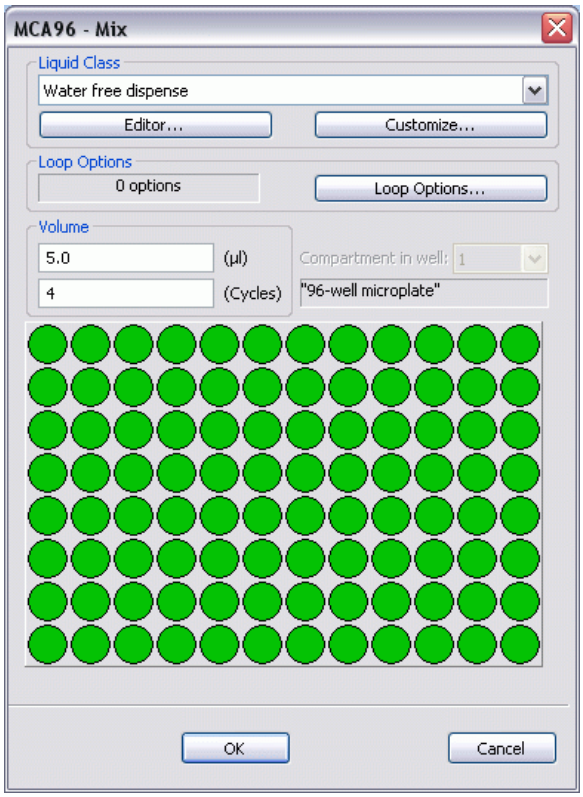

Fig. 15-112 *MCA96 Mix command*

The parameters of the MCA96 Mix command are as follows:

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Aspirate or Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

The MCA96 does not support liquid level detection (or emulated liquid level detection) for mixing. Accordingly, you cannot use a liquid class which specifies liquid level detection with this command.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Volume

Specify the volume that you want to aspirate for the mixing process. The same volume is pipetted by all of the tips. The maximum allowed volume is the plunger or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Cycles

Specify how often you want to repeat the mixing process.

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Specify the required labware by clicking on the labware in the Worktable Editor. You must first put an appropriate labware item in the Worktable Editor at the required position. The gray (protected) field above the location panel then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the MCA96 pipetting head has less tips than the number of wells in the labware, you must click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your selection will be shown in green.

15.68.4 MCA96 Wash Command

The MCA96 Wash command is used to wash MCA96 tips or MCA96 DITIs using the specified MCA96 wash block. The MCA96 wash block is intended for 96-tip MCA96 tip blocks and 96-tip DITi pipetting heads and is connected to the MCA96 Wash & Refill Center (WRC) through tubing. The MCA96 hardware supports up to two MCA96 wash blocks (each one with its own control unit). You can only put MCA96 wash blocks on the carrier type “MCA96 Carrier”.

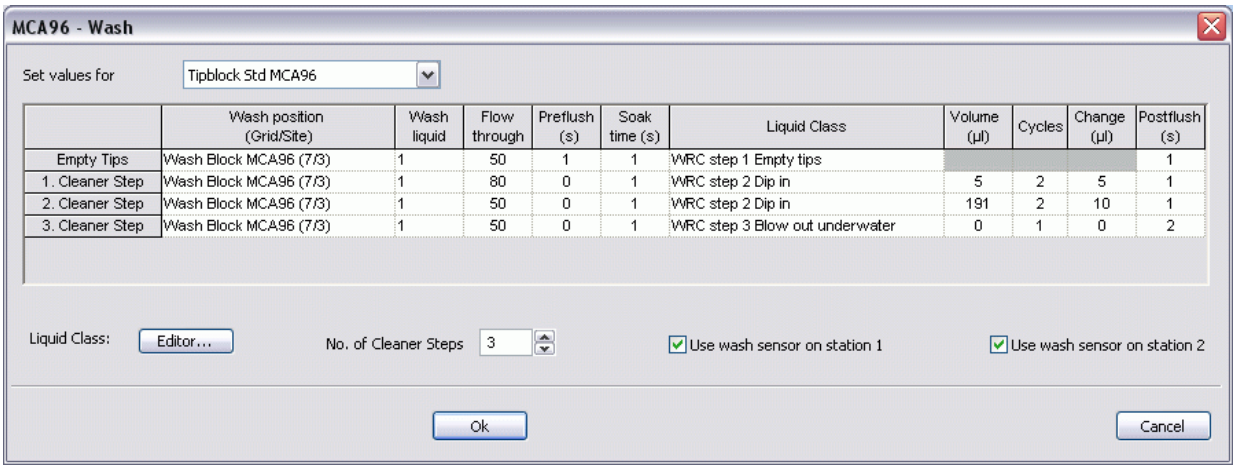
MCA96 - Wash
Set values for
Tipblock Std MCA96
Wash position (Grid/Site)
Wash liquid
Flow through
Preflush (s)
Soak time (s)
Liquid Class
Volume (µl)
Cycles
Change (µl)
Postflush (s)
Empty Tips
Wash Block MCA96 (7/3) 1 50 1 1 WRC step 1 Empty tips 1
1. Cleaner Step
Wash Block MCA96 (7/3) 1 80 0 1 WRC step 2 Dip in 5 2 5 1
2. Cleaner Step
Wash Block MCA96 (7/3) 1 50 0 1 WRC step 2 Dip in 191 2 10 1
3. Cleaner Step
Wash Block MCA96 (7/3) 1 50 0 1 WRC step 3 Blow out underwater 0 1 0 2
Liquid Class:
Editor...
No. of Cleaner Steps
3
Use wash sensor on station 1
Use wash sensor on station 2
Ok
Cancel

Fig. 15-113 *MCA96 Wash command*

The wash process normally consists of one *Empty Tips* step and one or more *Cleaner* steps. Start by choosing the required number of cleaner steps in the *No. of Cleaner Steps* field.

The parameters and steps of the MCA96 Wash command are as follows:

Set values for

Different wash parameters are needed for each of the MCA96 tip types. Choose the MCA96 tip type you are using from the pull-down list. This configures the MCA96 Wash command with the recommended wash parameters for the chosen tip type.

If you modify the recommended settings after choosing the tip type, the pull-down list will show “Edited values” instead of the tip type you chose.

The parameter sets with the recommended wash parameters are stored in the evoware.inf file (see A.4 “Parameters in the Evoware.inf file”, A-24, MCA96 Wash Parameters). The parameters in the evoware.inf file should only be changed by specialists.

In addition to choosing the tip type in the pull-down list, if you want to wash the whole outside of the tips (the whole length) you may need to adapt the liquid class parameter “Aspiration position, Z-offset” for the liquid class which is used for the first cleaner step (default “WRC step 2 dip in”) to ensure that the tips dip far enough into the wash liquid. A positive value for Z-offset lowers the tips. Note: You cannot change the properties of the pre-defined (standard) liquid classes. However you can create a new custom class with the same properties and then change them.

Note: *Take care to choose a parameter set to match the tips you are using and to adjust the Z-offset correctly. Incorrect parameters can lead to incomplete washing of the tips, which could cause cross-contamination under unfavorable circumstances.*

Empty Tips step

This step will only be executed if the excess volume or the leading airgap is still in the tips or the MCA96 plunger has not reached the start position.

During this step, the MCA96 head moves to the Z-dispense position above the wash block and any remaining liquid is expelled from the tips.

Cleaner step

During each cleaner step, the MCA96 moves the tips into the wash block to the Z-max position and waits for the specified soak time. The MCA96 then aspirates and dispenses the specified volume of wash liquid. Specify the *Cycles* parameter to repeat aspiration and dispensing several times if necessary. The WRC washing pumps operate during the entire cleaner step. The MCA96 head moves up and the washing pumps stop at the end of each step.

You can specify the wash liquid (1 or 2) you want to use in the wash block. In addition, the wash block can be flushed for a specified time before starting (Preflush) and after finishing (Postflush) each step.

Wash position

For each of the steps, click on this table field and choose the required wash block from the pull down list. The list shows all MCA96 wash blocks which are currently positioned on the MCA96 in the Worktable Editor (the grid position and the site of the wash block site are shown in brackets). The MCA96 hardware supports up to two MCA96 wash blocks. You can only put MCA96 wash blocks on the carrier type “MCA96 Carrier”.

Wash liquid

You can connect two different wash liquid containers to the WRC. Specify the wash liquid you want to use in the wash block.

Flow through [%]

Specify the flow rate of the pressure pump of the WRC (range: 1 - 100%; 100% is the maximum flow rate).

Preflush [s]

Specify how long the wash block should be flushed at the beginning of the step (range: 0 -1000 s).

Soak time [s]

Specify how long the tips should soak in the wash block before aspirating and dispensing the wash liquid (range: 0 - 200 s). You must specify at least 1 s for the last Cleaner step.

Liquid Class

Choose the liquid class of the wash liquid from the pull down list. Click the *Editor* button below the table to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1).

Volume [µl]

Specify the required volume of wash liquid in the cleaner step. The maximum allowed volume is the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity).

Cycles

Specifies how many times aspiration and dispensing of the wash liquid takes place in the cleaner step. If you specify 0, aspiration and dispensing the wash liquid will not be carried out.

Change [µl]

Specify an optional volume of wash liquid which is added to the specified aspiration and dispense volume for each subsequent cycle of the cleaner step. A negative value means that less wash liquid will be used for each subsequent cycle. This parameter can be used to optimize the effectiveness of the washing process. The total volume (*Volume* + *Change*) should not exceed the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Postflush [s]

Specify how long the wash block should be flushed at the end of the step (range: 0 - 1000 s).

Liquid class editor

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1).

Use wash sensor on station 1 / station 2

The MCA96 hardware supports up to two MCA96 Wash Blocks. Use the checkboxes to switch the wash liquid level detection on or off for the two wash blocks. The wash block sensors should normally be switched on for both wash blocks, but can be disabled e.g. if you are using a wash liquid with a high electrical resistance which cannot be detected reliably.

15.68.5 MCA96 Get DITIs Command

The MCA96 Get DITIs command is used to pick up disposable tips for the multi channel arm from a specified position on the worktable of the pipetting instrument. For mechanical reasons, you can only put MCA96 DITI racks on the carrier type “MCA96 Carrier”.

Fig. 15-114 *MCA96 Get DITIs command*

The parameters of the MCA96 Get DITIs command are as follows:

Position

Specify the position where the MCA96 should get the DITIs by clicking on the MCA96 DITI rack in the Worktable Editor. The type or label (name), the grid position and the site of the DITI rack are then shown in the gray (protected) fields. You must first put an MCA96 DITI rack in the Worktable Editor at the required position. You can only put MCA96 DITI racks on the carrier type “MCA96 Carrier”.

Blowout airgap

Specify the volume of air to aspirate directly before getting the DITIs (range: 0 to 150 µl). When the tips are washed, the air is dispensed at the end of the wash procedure and serves to make sure that all of the wash liquid remaining in the tips is discarded. In contrast to the Leading Airgap (which is specified in the liquid classes), the blowout airgap is only relevant for washing the tips and is not dispensed by the Dispense command.

Pickup Rows, Columns

Specify how many rows and columns of DITIs you want to pick up. Specify 8 rows and 12 columns if you want to pick up DITIs for all tip positions. Your settings are used internally by Freedom EVOware to adjust the mechanical force which is needed to pick up the DITIs. The force is proportional to the total number of DITIs (see A.3 “Parameters in the Evoware.opt file”, A-17, [MCA] section). Your settings are also used to assign pipetting information to the correct tip positions in report files created with the Export Data command.

Your settings do not affect how many tips are picked up. If you want to pick up less than 96 tips you must either:

– Use a DITI rack which does not have DITIs at all tip positions and pick up the DITIs without using an offset, or
– Offset the MCA96 pipetting head using the MCA96 Relative Movements command before picking up the DITIs (see 15.68.9 “MCA96 Relative Movements Command”, 15-171).

Remove rack

This checkbox is only available in **Freedom EVOware Plus** and is intended for nested DITIs labware. This labware type uses a special DITI rack design with 96 DITIs which can be stacked to form a pile of racks. Check this checkbox if you want the Get DITIs command to remove and discard the empty rack after all the DITIs in the layer have been used. This reveals the next layer of unused DITIs below. The rack is removed and discarded using the RoMa. This is handled by a special process which is provided for this purpose.

If you check this checkbox, you must specify a special DITI waste location for discarding the empty DITI racks. To do this, right click on a DITI waste on the worktable and choose *Waste for DITI racks* from the context menu. A tick alongside this context menu item shows that this location will then be used for the empty DITI racks. This option is only available for the DITI waste site of a DITI carrier with waste and is only intended for discarding empty DITI racks.

Freedom EVOware Standard: You must use a RoMa command to discard the empty rack after all the DITIs in the layer have been used.

15.68.6 MCA96 Drop DITIs Command

The MCA96 Drop DITIs command is used to return the disposable tips of the multi channel arm to a specified position on the worktable of the pipetting instrument. For mechanical reasons, you can only put MCA96 DITI racks on the carrier type “MCA96 Carrier”.

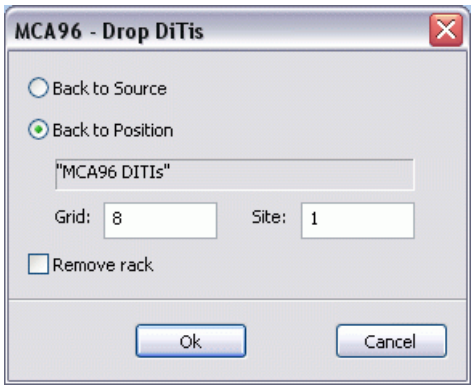

Fig. 15-115 *MCA96 Drop DITIs command*

The parameters of the MCA96 Drop DITIs command are as follows:

Back to source

This option returns the DITIs back to the grid and site position from where they were fetched with the MCA96 Get DITIs command.

Note: *If you switch off the pipetting instrument with the DITIs still attached, it will forget the grid and site position from where the DITIs were fetched. The option Back to source will then display an error message when the script is validated.*

Back to position

Specify the position where the MCA96 should return the DITIs by clicking on the MCA96 DITI rack in the Worktable Editor. The type or label (name), the grid position and the site of the DITI rack are then shown in the gray (protected) fields. You must first put a MCA96 DITI rack in the Worktable Editor at the required position. You can only put MCA96 DITI racks on the carrier type “MCA96 Carrier”.

Remove rack

This checkbox is only available in **Freedom EVOware Plus** and is intended for nested DITIs labware. This labware type uses a special DITI rack design with 96 DITIs which can be stacked to form a pile of racks. Check this checkbox if you want the Drop DITIs command to remove and discard the rack after putting down the DITIs. A special process is then started which carries out the following movements:

– The DITIs are put down on the pile of nested tips.
– The RoMa picks up the rack on the top of the pile together with the DITIs and discards them.

If you check this checkbox, you must choose a special DITI waste location for discarding the DITI racks and the DITIs. To do this, right click on a DITI waste on the worktable and choose *Waste for DITI racks* from the context menu. A tick alongside this context menu item shows that this location will then be used for the empty DITI racks. This option is only available for the DITI waste site of a DITI carrier with waste and is only intended for discarding empty DITI racks.

Freedom EVOware Standard: You must use a RoMa command if you want to discard the rack.

15.68.6.1 Side movements when dropping MCA96 DITIs

Under unusual environmental conditions (e.g. very dry ambient air), MCA96 DITIs may not drop reliably due to electrostatic charging of the plastic tips. In such cases, you can specify an optional side and/or vertical movement of the MCA96 pipetting head directly after releasing the tips.

This is done by adding entries to the [MCA] section of the configuration file evoware.opt using a text editor. evoware.opt is in the <install_path>\Database directory.

Add the following line to move by 10 instrument steps (10 x 0.1 mm) in the X direction:

DITI_SIDE_STEPS_X=10

Add the following line to move by 20 instrument steps in the Y direction:

DITI_SIDE_STEPS_Y=20

Add the following line to move by 15 instrument steps in the Z direction:

DITI_SIDE_STEPS_Z=15

Recommended value for DITI_SIDE_STEPS_X when using this feature: -180

Recommended value for DITI_SIDE_STEPS_Y when using this feature: 0
Recommended value for DITI_SIDE_STEPS_Z when using this feature: 90
To disable this feature, set the values to 0 or remove the entries from the evoware.opt file.
The above settings only affect the MCA96 Drop DITIs command.

Note: *Freedom EVOware must be re-started for the changes to take effect.*

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing evoware.opt, you will be warned that this file now has an invalid checksum. Confirm the prompt with Yes and proceed as follows to repair the checksum:

- Click Configure in the Toolbar to start the Configuration Tool. You will be warned again that evoware.opt has an invalid checksum and you will be asked if you want to checksum to be repaired. Click Yes. Then Click Exit to return to Freedom EVOware.

15.68.7 MCA96 Get Tip Block Command

The MCA96 Get Tip Block command is used to pick up a tip block for the MCA96 from a specified position on the worktable of the pipetting instruments. For mechanical reasons, you can only put MCA96 tip blocks on the carrier type “MCA96 Carrier”.

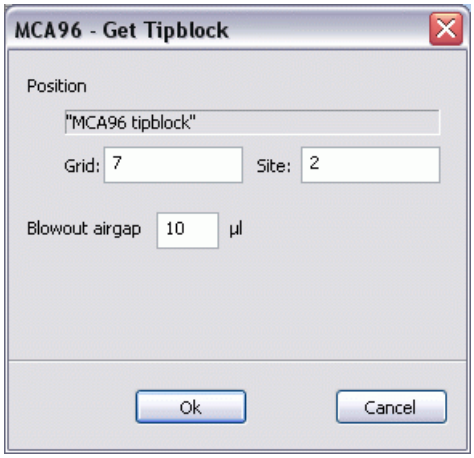

Fig. 15-116 *MCA96 Get Tip Block command*

The parameters of the MCA96 Get Tip Block command are as follows:

Position

Specify the position where the MCA96 should get the tip block by clicking on the MCA96 tip block in the Worktable Editor. The type or label (name), the grid position and the site of the tip block are then shown in the gray (protected) fields. You must first put a MCA96 tip block in the Worktable Editor at the required position. You can only put MCA96 tip blocks on the carrier type “MCA96 Carrier”.

Blowout airgap

Specify the volume of air to aspirate directly before getting the tip block (range: 0 to 150 µl). When the tips are washed, the air is dispensed at the end of the wash procedure and serves to make sure that all of the wash liquid remaining in the tips is discarded. In contrast to the Leading Airgap (which is specified in the liquid classes), the blowout airgap is only relevant for washing the tips and is not dispensed by the Dispense command.

15.68.8 MCA96 Drop Tip Block Command

The MCA96 Drop Tip Block command is used to put down the tipblock of the MCA96 at a specified position on the worktable of the pipetting instrument. For mechanical reasons, you can only put MCA96 DITI tip blocks on the carrier type “MCA96 Carrier”.

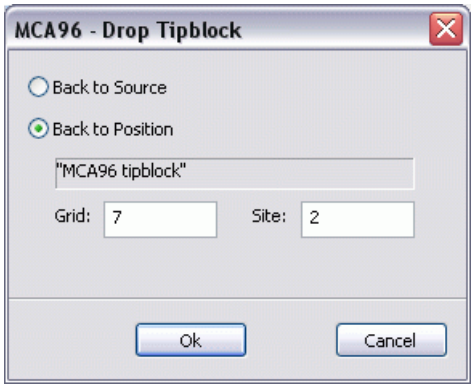

Fig. 15-117 *MCA96 Drop Tip Block command*

The parameters of the MCA96 Drop Tip Block command are as follows:

Back to source

This option returns the tip block back to the grid and site position from where it was fetched with the MCA96 Get Tip Block command.

Note: *If you switch off the pipetting instrument with the tip block still attached, it will forget the grid and site position from where the tip block was fetched. The option Back to source will then display an error message when the script is validated.*

Back to position

Specify the position where the MCA96 should discard the tip block by clicking on the MCA96 tip block in the Worktable Editor. The type or label (name), the grid position and the site of the tip block are then shown in the gray (protected) fields. You must first put a MCA96 tip block in the Worktable Editor at the required position. The gray (protected) field then shows the type or the label (name) of the selected item. You can only put MCA96 tip blocks on the carrier type “MCA96 Carrier”.

15.68.9 MCA96 Relative Movements Command

The MCA96 Relative Movements command is used to perform movements of the MCA96 with an offset. It can be used e.g. to program a serial dilution.

The MCA96 (multi channel arm) is normally used to perform pipetting operations on all of the wells of the labware simultaneously, whereby the MCA96 pipetting head is positioned directly above the labware. However, it can also be used to carry out operations such as serial dilution. In this case, pipetting takes place to one column or one row of the labware at a time. This is achieved by only picking up DITIs for a single column or row and positioning the MCA96 head with an offset to align the DITIs with the required wells.

To pick up DITIs for the required column or row of the MCA96 head, load the DITIs into only one column or row of the new DITI rack and then use the MCA96 Get DITIs command in the normal way (with an offset of 0). See also Fetching DITIs, below.

For fixed tips, you can use a special tip block which only has tips fitted to one row or column.

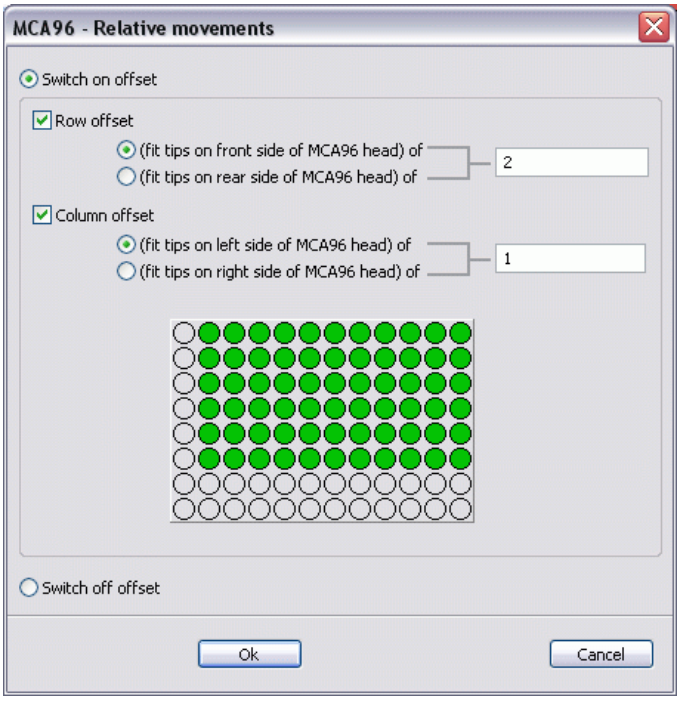
MCA96 - Relative movements
Switch on offset
Row offset
(fit tips on front side of MCA96 head) of
(fit tips on rear side of MCA96 head) of
2
Column offset
(fit tips on left side of MCA96 head) of
(fit tips on right side of MCA96 head) of
1
Switch off offset
Ok
Cancel

Fig. 15-118 *MCA96 Relative Movements command*

The graphical illustration in the dialog box for this command shows the wells of the labware (or tip positions of the DITI rack) and not the tips on the MCA96 pipetting head.

For example, if you pick up DITIs after moving the MCA96 pipetting head to the rear right side of the DITI rack (the positions at the rear right side of the illustration are marked green, see figure), the DITIs will be picked up on the front left side of the pipetting head.

The parameters of the MCA96 Relative Movements command are as follows:

Row offset (fit tips on front side of MCA96 head)

Specify the required row offset. Fit the tips on the front row(s) of the MCA96 head.

Row offset (fit tips on rear side of MCA96 head)

Specify the required row offset. Fit the tips on the rear row(s) of the MCA96 head.

Column offset (fit tips on left side of MCA96 head)

Specify the required column offset. Fit the tips on the left column(s) of the MCA96 head.

Column offset (fit tips on right side of MCA96 head)

Specify the required column offset. Fit the tips to the right column(s) of the MCA96 head.

Switch off offset

This cancels a previously specified offset (row and column) and resets the MCA96 pipetting head to the default position. It has the same effect as specifying a row offset of 0 and a column offset of 0.

Note: *You must switch off the offset before fetching a tipblock with the MCA96 Get Tipblock command. In addition, it is recommended to switch off the offset when you no longer want to use MCA96 offsets in your script.*

Fetching DITIs

If required, you can specify a row or column offset before fetching the DITIs with the MCA96 Get DITIs command. Use this feature if you do not want to pick up DITIs for all of the rows or columns of the pipetting head. If you use an offset, make sure that the pipetting head will not collide with other objects, e.g. other DITIs in the DITI rack. Please contact Tecan for further information.

Note: *You can also specify variables in the row offset and column offset fields. This can be used to offset the MCA96 pipetting head incrementally within a loop of your pipetting script.*

15.68.10 MCA96 Move Command

The MCA96 Move command is used to move the MCA96 from one position to another without performing an Aspirate or Dispense operation:

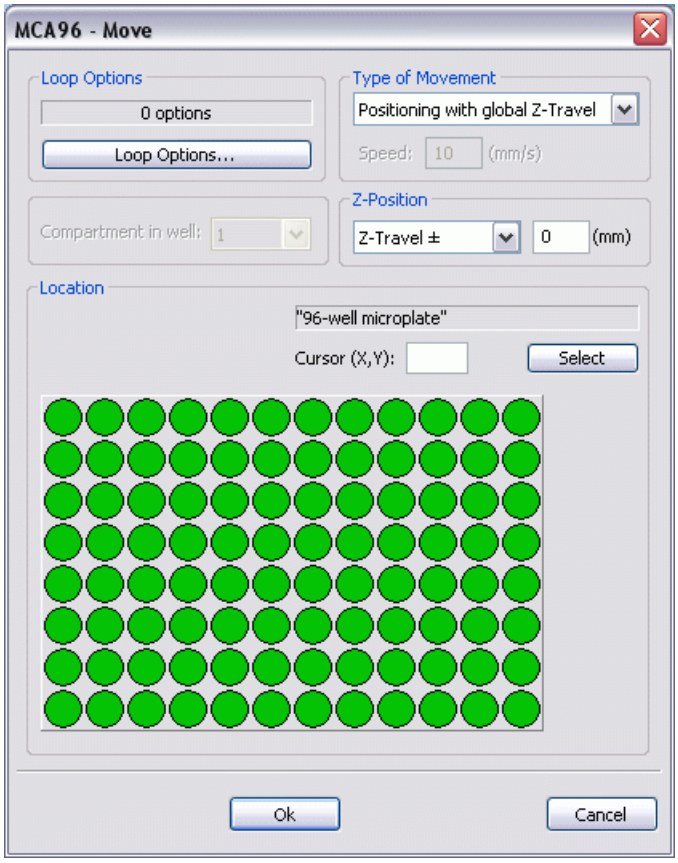

Fig. 15-119 *MCA96 Move command*

The parameters of the MCA96 Move command are as follows:

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row, well and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Type of movement

Choose X-Move, Y-Move or Z-Move to move only one axis of the MCA96. You can then specify the speed of the movement.

The options *Positioning with global Z-travel* and *Positioning with local Z-travel* move the MCA96 to the labware at maximum speed. Z-travel is the tip height which is used during the arm movement.

Z-Position

Unless you have chosen X-Move or Y-Move in the *Type of Movement* field, you can specify the Z-Position to which the tips should be lowered at the end of the MCA96 movement. Choose the required Z-position and then specify a Z offset in mm if required. A positive value for the offset lowers the tips.

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Select the labware which you want to use by clicking on the labware in the Worktable Editor. The gray (protected) field at the top right of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the MCA96 pipetting head has less tips than the number of wells in the labware, you must then click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your well selection is shown in green.

Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

Select: Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. In addition, it has no effect if the pipetting head has the same number of tips as the number of wells in the labware.

15.68.11 MCA96 Vector Command

The MCA96 Vector command executes an MCA96 vector, which is a predefined sequence of MCA96 movements. You can also specify gripper actions at the Safe and End positions. Gripper actions require the MCA96 gripper option.

MCA96 vectors are very similar to RoMa vectors. See 9.6.1 “Using RoMa Vectors”, 9-58. The main difference is that the MCA96 gripper fingers cannot be rotated (they are always parallel to the X axis of the pipetting instrument). Accordingly, you cannot specify the R axis for MCA96 vectors.

When setting up the hardware, the MCA96 gripper option can be attached to the MCA96 pipetting head on the left side with the gripper fingers pointing to the right (under the head) or on the right side with the gripper fingers pointing to the left (under the head) or to the right (away from the head). On the left side and pointing to the left is not supported.

The MCA96 Vector command is intended for special MCA96 movements and not for moving labware from one position to another - you should use the MCA96 Transfer Labware command instead for this purpose. See 15.58.1 “Moving labware with the RoMa Vector command”, 15-142 for additional information which is also applicable to the MCA96.

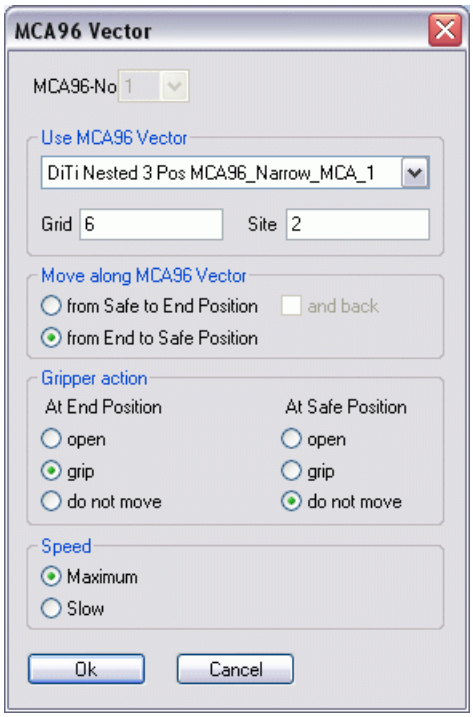

Fig. 15-120 *MCA96 Vector command*

The parameters of the MCA96 Vector command are as follows:

MCA96-No.

The pull-down list is gray (inactive) and preset to MCA 1 because current Freedom EVO pipetting instruments can only be fitted with one MCA96.

Use MCA96 Vector

Choose the MCA96 vector you want to use for the MCA96 movement. The popup list shows the MCA96 vectors which are currently defined in the Freedom EVOware database.

The digit at the end of the vector name (e.g. MP 3Pos_Narrow_MCA_1) indicates the MCA96 for which the vector was defined (1 or 2).

Then specify the grid position and carrier site for which the vector is intended. The Grid field is protected (gray) if you have chosen a vector for a device which is not positioned on the worktable (see Carrier is Device checkbox in the carrier definition).

Tip: If you click on a carrier, the current grid position is shown in the small yellow tab at the bottom left.

Move along MCA96 Vector

Choose the required direction of the MCA96 movement. Click *And back* if you want the MCA96 to return to the Safe position after reaching the End position.

Gripper action

Choose the gripper action which should be executed at the Safe position and at the End position. The required gripper spacing to pick up and release the labware is taken from the Grip Width and Release Width parameters in the chosen MCA96 vector.

Speed

Choose *Maximum* if you want the MCA96 to move at maximum speed. Choose *Slow* if you want the MCA96 to move at the speed specified in the MCA96 vector.

15.68.12 MCA96 Transfer Labware Command

The MCA96 Transfer Labware command is used to transfer labware (e.g. a microplate) from one position to another with the MCA96 gripper. This command requires the MCA96 gripper option.

If you have scanned the labware barcode and you move the labware with the MCA96 Transfer Labware command, the barcode remains assigned to the labware (i.e. the labware data record) at the new location. In addition, pipetting information, if any, remains assigned to the labware (see 15.26 “Export Data Command”, 15-48).

MCA96 vectors are very similar to RoMa vectors. See 9.6.1 “Using RoMa Vectors”, 9-58. The main difference is that the MCA96 gripper fingers cannot be rotated (they are always parallel to the X axis of the pipetting instrument). Accordingly, you cannot specify the R axis for MCA96 vectors.

When setting up the hardware, the MCA96 gripper option can be attached to the MCA96 pipetting head on the left side with the gripper fingers pointing to the right (under the head) or on the right side with the gripper fingers pointing to the left (under the head) or to the right (away from the head). On the left side and pointing to the left is not supported.

Grip and release commands for the MCA96 (used to pick up and put down the labware) are handled automatically. The required gripper spacing is taken from the advanced properties for the respective labware type (see 9.4.2 “Editing Labware, Advanced Tab”, 9-22).

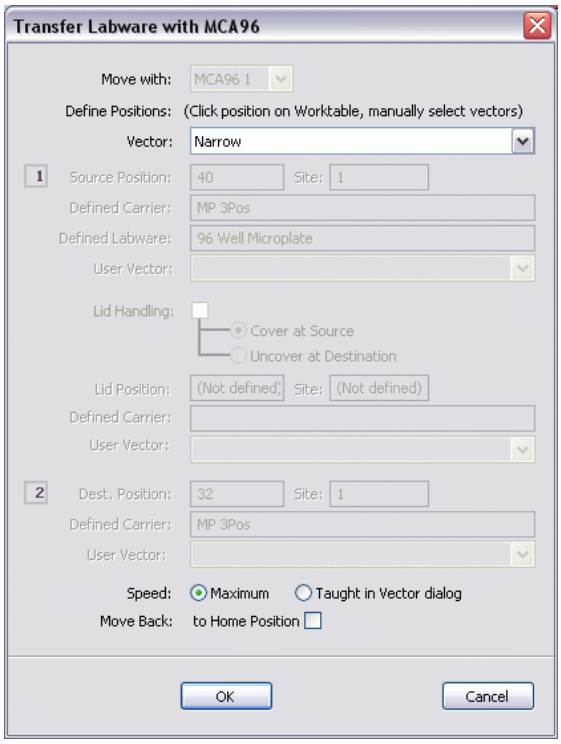

Fig. 15-121 *MCA96 Transfer Labware command*

The parameters of the MCA96 Transfer Labware command are as follows:

Move with

The pull-down list is gray (inactive) and preset to MCA96 1 because current Freedom EVO pipetting instruments can only be fitted with one MCA pipetting arm.

Vector

Choose the MCA96 vector that you want to use to pick up the labware.

The MCA96 only supports the vector type Narrow, which picks up the labware on the narrow side.

Choose User defined (Narrow) to pick up the labware on the narrow side with a **user-defined vector**. In this case, you must choose the user-defined vector to use for picking up the labware at the source position and putting down it at the destination position in the two *User Vector* pull-down lists. User-defined vectors are created in the Control Bar (Robot Vectors section). See 5.4.1.6 “Robot Vectors”, 🗎 5-12.

Above all if you did not create the user-defined vector yourself, we recommend you to check carefully that the vector moves the MCA96 to the correct (i.e. intended) source and destination carrier positions before using it for pipetting. Tip: Test the MCA96 vector in a script using the 3D simulation program EVOSim.

Freedom EVOware will report an error when you complete the Transfer Labware command if the MCA96 vector has not yet been created for the chosen labware type. It is best to create the required MCA96 vector in advance. MCA96 vectors are very similar to RoMa vectors (see 9.6.2 “Teach Plate Robot Vector Dialog Box”, 🗎 9-59).

⌦ Transfer Labware command, Step 1

Specify the parameters for the source position:

Source position

Select the current position of the labware by clicking on it in the Worktable Editor.

Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site and the gray (protected) field *Defined Labware* shows the type of labware at the chosen site.

If you want to fetch the labware from a device such as a hotel or barcode scanner, click on the device icon. You then need to choose the site and the labware type. The list shows labware types which are allowed for the device (see 9.5 “Configuring Carriers”, 🗎 9-39, “Allowed Labware on this carrier”).

⌦ Transfer Labware command, Step 2

Specify the parameters for the labware lid. These parameters are only available for labware types which can be fitted with a lid:

Lid handling

Check this checkbox if the labware has a lid. Choose *Cover at source* if you want to put on the lid before moving the labware. Choose *Uncover at destination* if you want to remove the lid after moving the labware to the destination position (i.e. the lid was already present). In either case, select the position for fetching or putting aside the lid by clicking on the site in the Worktable Editor. Grid and Site then show the position you have chosen. The gray (protected) field Defined Carrier shows the type of carrier on which the lid is placed/will be placed. You can only put aside lids on unused carrier sites.

⌦ Transfer Labware command, Step 3

Specify the parameters for the destination position:

Destination Position

Select the required destination position of the labware by clicking on the site in the Worktable Editor.

The destination site must be suitable for the labware type you are moving (see 9.5 “Configuring Carriers”, 🗎 9-39, “Allowed labware on this carrier”).

Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site.

If you want to move the labware to a device such as a hotel or barcode scanner, click on the device icon. You then need to choose the site and the labware type. The list shows labware types which are allowed for the device (see 9.5 “Configuring Carriers”, 🗎 9-39, “Allowed Labware on this carrier”).

Speed

Choose *Maximum* if you want the MCA96 to move at maximum speed. Choose *Taught in vector dialog* if you want the MCA96 to move at the speed specified in the MCA96 vector.

Move back to Home Position

Check this checkbox if you want the MCA96 to move back to its home (parking) position after transferring the labware. See 9.6.4 “Defining the Home Position for a RoMa”, 🗎 9-62.

15.69 MCA384 Commands

The MCA384 (Multi Channel Arm 384) is a special liquid handling arm which can be fitted with 96 or 384 fixed tips or with 96 or 384 disposable tips (DITIs). The spacing between the tips is fixed (9 mm and/or 4.5 mm). So-called head adapters are used to adapt the pipetting head to the different tip types.

The MCA384 has important performance advantages when pipetting to a large number of wells simultaneously. For mechanical reasons, the same volume is pipetted by all of the tips.

The MCA384 can be optionally fitted with a gripper system (CGM, common gripper module) which can be used to pick up and move labware. The gripper module can be rotated.

Freedom EVOware is provided with special liquid classes which should be used for pipetting with the MCA384.

For mechanical reasons, the MCA384 head adapters and the MCA384 wash block can only be put on the carrier type “MCA384 System Carrier”. In addition, for mechanical reasons the head adapters for 384 DITIs can only pick up all 384 DITIs if the DITI rack is on the MCA384 DITI carrier. See 15.69.1 “Overview of MCA384 head adapters”, 🗎 15-180.

Special features are provided in the Get and Drop DITIs commands to get and/or drop a single row or column of tips. In addition, the Aspirate, Dispense, Mix and Move commands can be performed on a single row or column of tips. Accordingly, in contrast to the MCA96 with 96 tips, the MCA384 does not need and does not have a Relative Movements command.

The MCA384 is compatible with nested DITIs, which have a special DITI rack design with 96 DITIs which can be stacked to form a pile of racks. The pile can be put on the worktable or stored in the Te-Stack. When the racks are stacked, the DITI tips slide inside the DITIs on the layer below to save space. Each layer of

DITIs has its own rack. In Freedom EVOware Plus, a feature is provided in the Get DITIs command to automatically discard the DITI racks to a waste location using the RoMa.

15.69.1 Overview of MCA384 head adapters

With the MCA384, so-called head adapters are used to adapt the pipetting head to the different tip types which are supported. The following head adapters are available:

Tab. 15-13 *Overview of MCA384 head adapters*

Head adapter	Description
Adapter DiTi Combo MCA384	Can pick up 384 DITIs from the MCA384 DITI Carrier. Can pick up a row of 24 DITIs or a column of 16 DITIs from the MCA384 System Carrier. Compatible with 15 µl, 50 µl and 125 µl disposable tips. Tip spacing 4.5 mm.
Adapter DiTi MCA384	Can pick up 384 DITIs from the MCA384 DITI Carrier. Compatible with 15 µl, 50 µl and 125 µl disposable tips. Tip spacing 4.5 mm.
Adapter 96 DiTi MCA384	Can pick up 96 DITIs from a box of 384 DITIs on the MCA384 DITI Carrier. Can pick up a row of 12 DITIs or a column of 8 DITIs from the MCA384 System Carrier. Compatible with 15 µl, 50 µl and 125 µl disposable tips. Tip spacing 9 mm.
Adapter 96 DiTi 4to1 MCA384	Can pick up 96 DITIs from a box of 384 DITIs on the MCA384 DITI Carrier. Can pick up a row of 12 DITIs or a column of 8 DITIs from the MCA384 System Carrier. Compatible with 15 µl, 50 µl and 125 µl disposable tips. Tip spacing 9 mm. Compared to “MCA384 Adapter for 96 DITIs”, this special head adapter uses four plungers per tip instead of one. This allows a larger max. pipetted volume.[a)]
Adapter Fixed 125µl MCA384	Tipblock with 384 fixed tips. Each tip has a capacity of 125 µl. Tip spacing 4.5 mm.
Adapter Fixed 15µl MCA384	Tipblock with 384 fixed tips. Each tip has a capacity of 15 µl. Tip spacing 4.5 mm.
Adapter 96 Fixed 125µl MCA384	Tipblock with 96 fixed tips. Each tip has a capacity of 125 µl. Tip spacing 9 mm.
Adapter 96 Fixed 15µl MCA384	Tipblock with 96 fixed tips. Each tip has a capacity of 15 µl. Tip spacing 9 mm.
Adapter QC MCA384	This special head adapter is used to protect the pipetting head during transport and storage and is not intended for pipetting.

a) This head adapter type is currently not available in all countries.

All head adapter types have an ID (magnetic bit pattern from 1 to 15) to allows automatic identification by the pipetting head. It is used to check that the correct head adapter has been mounted.

15.69.2 MCA384 Aspirate Command

The MCA384 Aspirate command is used to pick up liquid from specified positions on the worktable of the pipetting instrument using the multi channel arm.

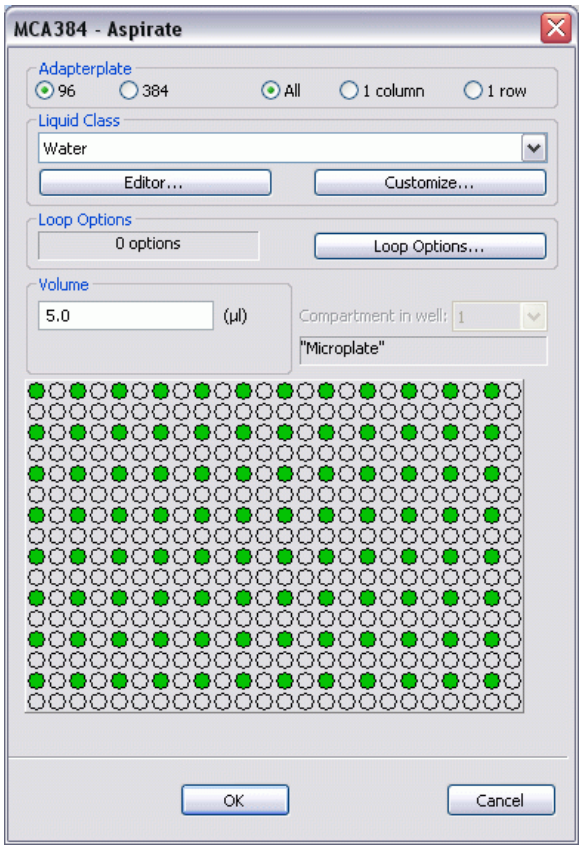

Fig. 15-122 *MCA384 Aspirate command*

The parameters of the MCA384 Aspirate command are as follows:

Head adapter

You must pick up a suitable head adapter and/or tips before you pipette. Choose the number of tips which are fitted to the pipetting head. In addition, you can choose to pipette using all tips, one column of tips or one row of tips.

The Aspirate command moves the plungers for all tip positions simultaneously. Accordingly, to pipette to one column of tips or one row of tips the pipetting head should be fitted in advance with one column of DITIs or one row of DITIs using the Get DITIs command. The one column or one row option is only supported by the head adapters “Adapter DiTi Combo MCA384”, “Adapter 96 DiTi MCA384” and “Adapter 96 DiTi 4to1 MCA384” and only for DITI racks positioned on the MCA384 System Carrier. It is not supported for fixed tips.

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

The MCA384 does not support liquid level detection. If you want to use a liquid class for the MCA384 which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 14-7). The MCA384 can use the emulated liquid level detection for aspiration, dispensing and mixing.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Volume

Specify the required pipetting volume. The same volume is aspirated by all of the tips. The maximum allowed volume is the plunger or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Specify the required labware by clicking on the labware in the Worktable Editor. You must first put an appropriate labware item in the Worktable Editor at the required position. The gray (protected) field above the location panel then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the MCA384 pipetting head has less tips fitted than the number of wells in the labware, you must click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your selection will be shown in green.

15.69.3 MCA384 Dispense Command

The MCA384 Dispense command is used to dispense liquid to specified positions on the worktable of the pipetting instrument using the multi channel arm.

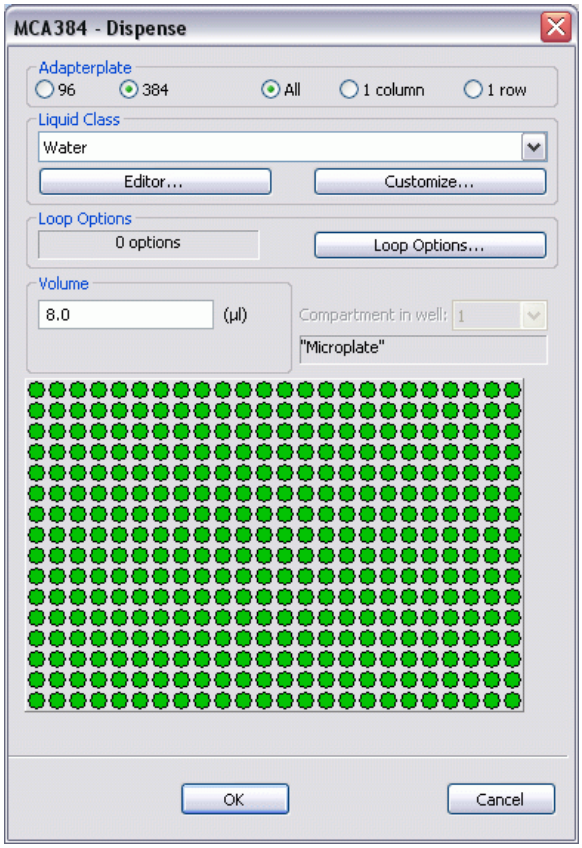

Fig. 15-123 *MCA384 Dispense command*

The parameters of the MCA384 Dispense command are as follows:

Head adapter

You must pick up a suitable head adapter and/or tips before you pipette. Choose the number of tips which are fitted to the pipetting head. In addition, you can choose to pipette using all tips, one column of tips or one row of tips.

The Dispense command moves the plungers for all tip positions simultaneously. Accordingly, to pipette to one column of tips or one row of tips the pipetting head should be fitted in advance with one column of DITIs or one row of DITIs using the Get DITIs command. The one column or one row option is only supported by the head adapters “Adapter DiTi Combo MCA384”, “Adapter 96 DiTi MCA384” and “Adapter 96 DiTi 4to1 MCA384” and only for DITI racks positioned on the MCA384 System Carrier. It is not supported for fixed tips.

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

The MCA384 does not support liquid level detection. If you want to use a liquid class for the MCA384 which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 14-7). The MCA384 can use the emulated liquid level detection for aspiration, dispensing and mixing.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Volume

Specify the required pipetting volume. The same volume is dispensed by all of the tips. The maximum allowed volume is the plunger or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Specify the required labware by clicking on the labware in the Worktable Editor. You must first put an appropriate labware item in the Worktable Editor at the required position. The gray (protected) field above the location panel then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the MCA384 pipetting head has less tips fitted than the number of wells in the labware, you must click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your selection will be shown in green.

15.69.4 MCA384 Mix Command

The MCA384 Mix command performs a mix operation by aspirating and then dispensing at the same position using the multi channel arm.

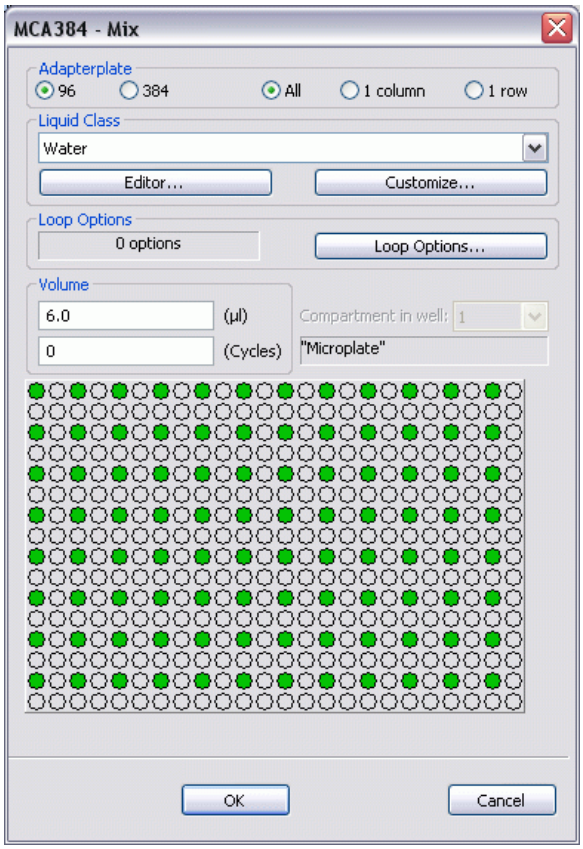

Fig. 15-124 *MCA384 Mix command*

The parameters of the MCA384 Mix command are as follows:

Head adapter

You must pick up a suitable head adapter and/or tips before you pipette. Choose the number of tips which are fitted to the pipetting head. In addition, you can choose to pipette using all tips, one column of tips or one row of tips.

The Mix command moves the plungers for all tip positions simultaneously. Accordingly, to pipette to one column of tips or one row of tips the pipetting head should be fitted in advance with one column of DITIs or one row of DITIs using the Get DITIs command. The one column or one row option is only supported by the head adapters “Adapter DiTi Combo MCA384”, “Adapter 96 DiTi MCA384” and “Adapter 96 DiTi 4to1 MCA384” and only for DITI racks positioned on the MCA384 System Carrier. It is not supported for fixed tips.

Liquid Class

Choose the required liquid class from the pull down list. The list only shows liquid classes which are suitable for the current configuration of the pipetting instrument.

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1). Furthermore you can customize an existing liquid class for use by this command only (click the *Customize* button and click the Aspirate or Dispense tab). If you customize an existing liquid class, the liquid class name is shown in the script command and in the script editor within double angled brackets “>> name <<“.

Note: *Instead of customizing a liquid class which is only used by a single instance of this command, it is better practice to create a custom liquid class with the liquid class editor which can then be used by any command and any script.*

The MCA384 does not support liquid level detection. If you want to use a liquid class for the MCA384 which specifies liquid level detection, the liquid level must be emulated using a special variable (see 14.1.4.14 “RACK_VOLUME_x”, 14-7). The MCA384 can use the emulated liquid level detection for aspiration, dispensing and mixing.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Volume

Specify the volume that you want to aspirate for the mixing process. The same volume is pipetted by all of the tips. The maximum allowed volume is the plunger or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Cycles

Specify how often you want to repeat the mixing process.

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Specify the required labware by clicking on the labware in the Worktable Editor. You must first put an appropriate labware item in the Worktable Editor at the required position. The gray (protected) field above the location panel then shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the MCA384 pipetting head has less tips fitted than the number of wells in the labware, you must click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your selection will be shown in green.

15.69.5 MCA384 Wash Command

The MCA384 Wash command is used to wash the MCA384 tips or MCA384 DITIs using the specified MCA384 wash block. The MCA384 wash block is connected to the MCA384 Wash & Refill Center (WRC) through tubing. The MCA384 hardware supports up to two MCA384 wash blocks (each one with its own control unit). You can only put MCA384 wash blocks on the carrier type “MCA384 System Carrier”.

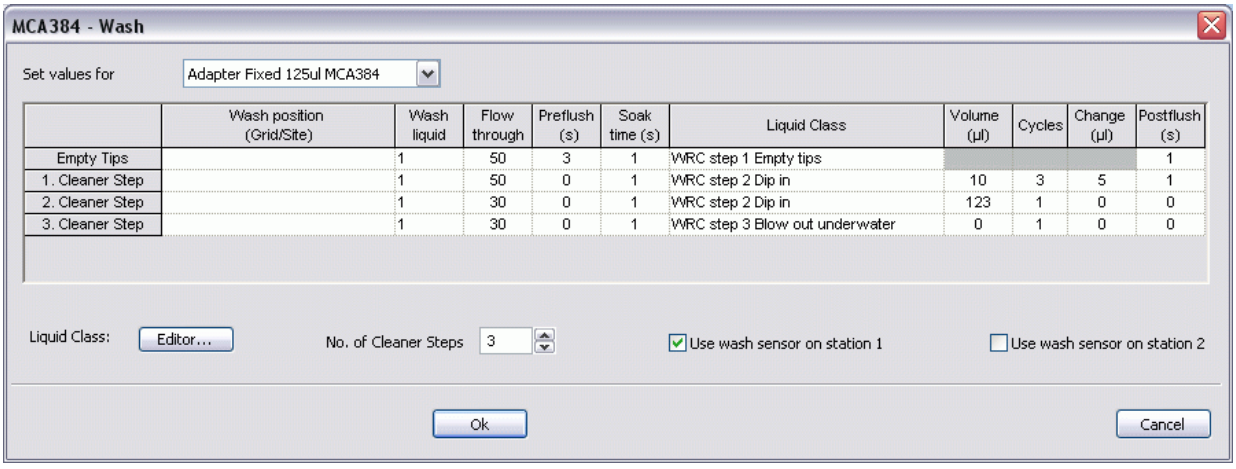
MCA384 - Wash
Set values for
Adapter Fixed 125ul MCA384
Wash position (Grid/Site)
Wash liquid
Flow through
Preflush (s)
Soak time (s)
Liquid Class
Volume (µl)
Cycles
Change (µl)
Postflush (s)
Empty Tips 1 50 3 1 WRC step 1 Empty tips 1
1. Cleaner Step 1 50 0 1 WRC step 2 Dip in 10 3 5 1
2. Cleaner Step 1 30 0 1 WRC step 2 Dip in 123 1 0 0
3. Cleaner Step 1 30 0 1 WRC step 3 Blow out underwater 0 1 0 0
Liquid Class:
Editor...
No. of Cleaner Steps
3
Use wash sensor on station 1
Use wash sensor on station 2
Ok
Cancel

Fig. 15-125 *MCA384 Wash command*

The wash process normally consists of one *Empty Tips* step and one or more *Cleaner* steps. Start by choosing the required number of cleaner steps in the *No. of Cleaner Steps* field.

The parameters and steps of the MCA384 Wash command are as follows:

Set values for

Different wash parameters are needed for each of the MCA384 tip types. Choose the MCA384 tip type you are using from the pull-down list. This configures the MCA384 Wash command with the recommended wash parameters for the chosen tip type.

If you modify the recommended settings after choosing the tip type, the pull-down list will show “Edited values” instead of the tip type you chose.

The parameter sets with the recommended wash parameters are stored in the evoware.xml file. For information on the location of this file see A.5 “Freedom EVOware Directory Structure and Files”, A-25. The parameters in the evoware.xml file should only be changed by specialists.

In addition to choosing the tip type in the pull-down list, if you want to wash the whole outside of the tips (the whole length) you may need to adapt the liquid class parameter “Aspiration position, Z-offset” for the liquid class which is used for the first cleaner step (default “MCA384 WRC Step 2 Dip in”) to ensure that the tips dip far enough into the wash liquid. A positive value for Z-offset lowers the tips. Note: You cannot change the properties of the pre-defined (standard) liquid classes. However you can create a new custom class with the same properties and then change them.

Note: *Take care to choose a parameter set to match the tips you are using and to adjust the Z-offset correctly. Incorrect parameters can lead to incomplete washing of the tips, which could cause cross-contamination under unfavorable circumstances.*

Empty Tips step

This step will only be executed if the excess volume or the leading airgap is still in the tips or the MCA384 plunger has not reached the start position.

During this step, the MCA384 head moves to the Z-dispense position above the wash block and any remaining liquid is expelled from the tips.

Cleaner step

During each cleaner step, the MCA384 moves the tips into the wash block to the Z-max position and waits for the specified soak time. The MCA384 then aspirates and dispenses the specified volume of wash liquid. Specify the *Cycles* parameter to repeat aspiration and dispensing several times if necessary. The WRC washing pumps operate during the entire cleaner step. The MCA384 head moves up and the washing pumps stop at the end of each step.

You can specify the wash liquid (1 or 2) you want to use in the wash block. In addition, the wash block can be flushed for a specified time before starting (Preflush) and after finishing (Postflush) each step.

Wash position

For each of the steps, click on this table field and choose the required wash block from the pull down list. The list shows all MCA384 wash blocks which are currently positioned on the MCA384 in the Worktable Editor (the grid position and the site of the wash block are shown in brackets). The MCA384 hardware supports up to two MCA384 wash blocks. You can only put MCA384 wash blocks on the carrier type “MCA384 System Carrier”.

Wash liquid

You can connect two different wash liquid containers to the WRC. Specify the wash liquid you want to use in the wash block.

Flow through [%]

Specify the flow rate of the pressure pump of the WRC (range: 1 - 100%; 100% is the maximum flow rate).

Preflush [s]

Specify how long the wash block should be flushed at the beginning of the step (range: 0 -1000 s).

Soak time [s]

Specify how long the tips should soak in the wash block before aspirating and dispensing the wash liquid (range: 0 - 200 s). You must specify at least 1 s for the last Cleaner step.

Liquid Class

Choose the liquid class of the wash liquid from the pull down list. Click the *Editor* button below the table to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1).

Volume [µl]

Specify the required volume of wash liquid in the cleaner step. The maximum allowed volume is the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the dilutor or DITI capacity).

Cycles

Specifies how many times aspiration and dispensing of the wash liquid takes place in the cleaner step. If you specify 0, aspiration and dispensing the wash liquid will not be carried out.

Change [µl]

Specify an optional volume of wash liquid which is added to the specified aspiration and dispense volume for each subsequent cycle of the cleaner step. A negative value means that less wash liquid will be used for each subsequent cycle. This parameter can be used to optimize the effectiveness of the washing process. The total volume (*Volume* + *Change*) should not exceed the dilutor or DITI capacity (Freedom EVOware does not automatically handle volumes that exceed the plunger or DITI capacity).

Postflush [s]

Specify how long the wash block should be flushed at the end of the step (range: 0 - 1000 s).

Liquid class editor

Click the *Editor* button to start the liquid classes editor if you want to create a new class or modify an existing class (see 10 “Configuring Liquid Classes”, 10-1).

Use wash sensor on station 1 / station 2

The MCA384 hardware supports up to two MCA384 Wash Blocks. Use the checkboxes to switch the wash liquid level detection on or off for the two wash blocks. The wash block sensors should normally be switched on for both wash blocks, but can be disabled e.g. if you are using a wash liquid with a high electrical resistance which cannot be detected reliably.

15.69.6 MCA384 Get Head Adapter Command

The MCA384 Get Head Adapter command is used to pick up a head adapter for the MCA384 from a specified position on the worktable of the pipetting instrument. For mechanical reasons, you can only put MCA384 head adapters on the carrier type “MCA384 System Carrier”. See 15.69.1 “Overview of MCA384 head adapters”, 15-180.

Fig. 15-126 *MCA384 Get Head Adapter command*

The parameters of the MCA384 Get Head Adapter command are as follows:

Position

Specify the position where the MCA384 should get the head adapter by clicking on the head adapter in the Worktable Editor. The type or label (name), the grid position and the site of the head adapter are then shown in the gray (protected) fields. You must first put an MCA384 head adapter in the Worktable Editor at the required position. You can only put MCA384 head adapters on the carrier type “MCA384 System Carrier”.

Blowout airgap

Specify the volume of air to aspirate directly after getting the head adapter (range: 0 to 50 µl). When the tips are washed, the air is dispensed at the end of the wash procedure and serves to make sure that all of the wash liquid remaining in the tips is discarded. In contrast to the Leading Airgap (which is specified in the liquid classes), the blowout airgap is only relevant for washing the tips and is not dispensed by the Dispense command.

15.69.7 MCA384 Drop Head Adapter Command

The MCA384 Drop Head Adapter command is used to put down the head adapter of the multi channel arm at a specified position on the worktable of the pipetting instrument. For mechanical reasons, you can only put MCA384 head adapters on the carrier type “MCA384 System Carrier”. See 15.69.1 “Overview of MCA384 head adapters”, 15-180.

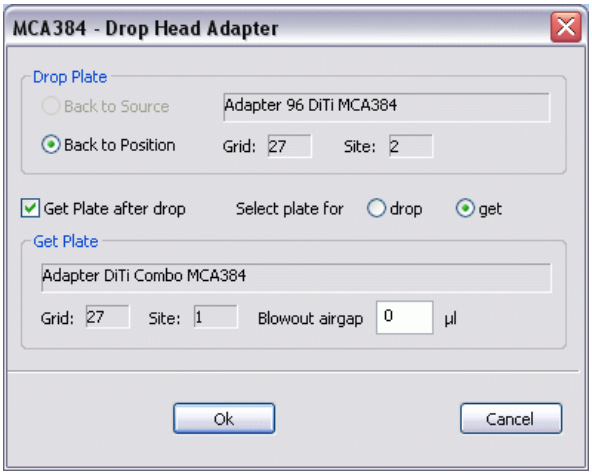

Fig. 15-127 *MCA384 Drop Head Adapter command*

The parameters of the MCA384 Drop Head Adapter command are as follows:

Back to source

This option returns the DITIs back to the grid and site position from where they were fetched with the MCA384 Get Head Adapter command.

Note: *If you switch off the pipetting instrument with the head adapter still attached, it will forget the grid and site position from where the head adapter was fetched. The option Back to source will then display an error message when the script is validated.*

Back to position

Specify the position where the MCA384 should return the head adapter by clicking on the head adapter in the Worktable Editor. The type or label (name), the grid position and the site of the head adapter are then shown in the gray (protected) fields. You must first put an MCA384 head adapter in the Worktable Editor at the required position. You can only put MCA384 head adapters on the carrier type “MCA384 System Carrier”.

Get adapter after drop

Check this checkbox if you want to get another head adapter after dropping the one which is currently fitted. This option is only available if you chose *Back to position* for dropping the head adapter.
Select adapter for drop or get: If you have already chosen labware positions for dropping the currently fitted head adapter and getting the new one and you change your mind, you can click on another head adapter in the Worktable Editor to chose a new position. Before doing this, click one of the radio buttons to choose whether you want to re-specify the dropping position or the getting position.

Get adapter

Specify the position where the MCA384 should get the new head adapter by clicking on the head adapter in the Worktable Editor. The type or label (name), the grid position and the site of the head adapter are then shown in the gray (protected) fields. You must first put an MCA384 head adapter in the Worktable Editor at the required position. You can only put MCA384 head adapters on the carrier type “MCA384 System Carrier”.

The new head adapter must be on the same MCA384 System Carrier as the one you have dropped. If this is not the case, you must drop the currently fitted head adapter with this command and use a separate Get Head Adapter command to get the new one. Dropping and getting the head adapter using the same command is faster.

Blowout airgap

Specify the volume of air to aspirate directly after getting the new head adapter (range: 0 to 50 µl). When the tips are washed, the air is dispensed at the end of the wash procedure and serves to make sure that all of the wash liquid remaining in the tips is discarded. In contrast to the Leading Airgap (which is specified in the liquid classes), the blowout airgap is only relevant for washing the tips and is not dispensed by the Dispense command.

15.69.8 MCA384 Get DITIs Command

The MCA384 Get DITIs command is used to pick up disposable tips for the multi channel arm from a specified position on the worktable of the pipetting instrument.

If the DITI rack is on the MCA384 System Carrier, you can pick up one row or one column of DITIs out of a box of 384 DITIs. See 15.69.8.1 “Limitations for different head adapter types (getting DITIs)”, 15-193 for more information.

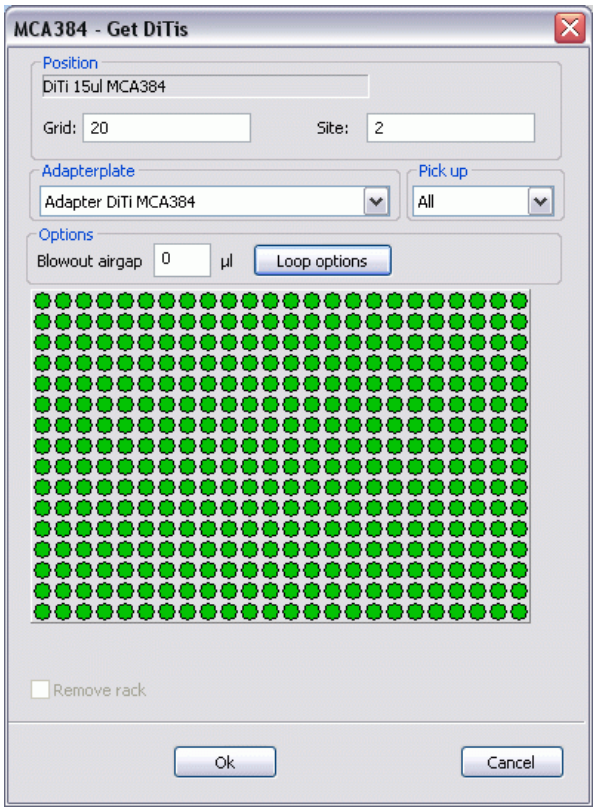

Fig. 15-128 *MCA384 Get DITIs command*

The parameters of the MCA384 Get DITIs command are as follows:

Position

Specify the position where the MCA384 should get the DITIs by clicking on the MCA384 DITI carrier in the Worktable Editor. The type or label (name), the grid position and the site of the DITI rack are then shown in the two fields. You must first put a MCA384 DITI rack in the Worktable Editor at the required position. See also 15.69.8.1 “Limitations for different head adapter types (getting DITIs)”, 15-193.

Head adapter

You must pick up a suitable head adapter with the Get Head Adapter command before you get the DITIs. Choose the head adapter type which is currently fitted to the MCA384 pipetting head.

Pick up

Specify whether you want to pick up all DITIs, one column of DITIs or one row of DITIs. The available options in the pull-down list depend on the chosen head adapter and DITI carrier type. With the one column or one row option, you can only pick up DITIs on the first or last column (left or right side) or the first or last row (rear or front side) of the pipetting head. See also 15.69.8.1 “Limitations for different head adapter types (getting DITIs)”, 15-193.

Blowout airgap

Specify the volume of air to aspirate directly after getting the DITIs (range: 0 to 50 µl). When the tips are washed, the air is dispensed at the end of the wash procedure and serves to make sure that all of the wash liquid remaining in the tips is discarded. In contrast to the Leading Airgap (which is specified in the liquid classes), the blowout airgap is only relevant for washing the tips and is not dispensed by the Dispense command.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Location

If the DITI Rack has more DITIs than the number of DITIs you want to pick up, you must click in the Location panel to select the DITIs that you want to pick up. This is not necessary if you want to pick up all of the DITIs in the DITI rack. See also 15.69.8.1 “Limitations for different head adapter types (getting DITIs)”, 15-193.

Your settings are also used to assign pipetting information to the correct tip positions in report files created with the Export Data command.

Remove rack

This checkbox is only available in **Freedom EVOware Plus** and is intended for nested DITIs labware. This labware type uses a special DITI rack design with 96 DITIs which can be stacked to form a pile of racks. Check this checkbox if you want the Get DITIs command to remove and discard the empty rack after all the DITIs in the layer have been used. This reveals the next layer of unused DITIs below. The rack is removed and discarded using the RoMa. This is handled by a special process which is provided for this purpose.

If you check this checkbox, you must specify a special DITI waste location for discarding the empty DITI racks. To do this, right click on a DITI waste on the worktable and choose *Waste for DITI racks* from the context menu. A tick alongside this context menu item shows that this location will then be used for the empty DITI racks. This option is only available for the DITI waste site of a DITI carrier with waste and is only intended for discarding empty DITI racks.

Freedom EVOware Standard: You must use a RoMa command to discard the empty rack after all the DITIs in the layer have been used.

15.69.8.1 Limitations for different head adapter types (getting DITIs)

The MCA384 has the following limitations when getting DITIs:

Adapter DiTi Combo MCA384

You can pick up all 384 DITIs if the DITI rack is on the MCA384 DITI Carrier but you cannot pick up one row or one column. The latter option requires a relative movement of the pipetting head which is not possible for mechanical reasons on the MCA384 DITI Carrier.

You can pick up one row or one column of DITIs if the DITI rack is on the MCA384 System Carrier but you cannot pick up all 384 DITIs. The latter option requires a locking mechanism for mechanical reasons which is not provided on the MCA384 System Carrier.

If you pick up one row or one column of DITIs, the Pick up parameter in the Get DITIs command lets you choose whether to mount them on the first or last column (left or right side) or the first or last row (rear or front side) of the pipetting head. The Position parameter then lets you specify the row or column in the DITI rack from where to get the DITIs. This requires a relative movement of the pipetting head.

Please note the following mechanical limitations: If you want to pick up e.g. DITIs on the first column (left side) of the pipetting head, you must pick them up starting with the last column (right side) of the DITI rack. If you pick up DITIs from column 23 and column 24 still contains DITIs, you will pick up two columns of DITIs instead of one column. Analogous limitations apply to picking up DITIs on the right side of the pipetting head and picking up single rows of DITIs on the front and rear of the pipetting head.

Adapter DiTi MCA384

You can only pick up DITIs if the DITI rack is on the MCA384 DITI Carrier. You can only pick up all 384 DITIs. The MCA384 DITI Carrier does not allow relative movements of the pipetting head.

Adapter 96 DiTi MCA384

You can pick up all 96 DITIs out of a box of 384 DITIs on any of the carrier types that allow the MCA384 DITI rack.

You can pick up one row or one column of DITIs out of a box of 384 DITIs if the DITI rack is on the MCA384 System Carrier. This requires a relative movement of the pipetting head which is not possible for mechanical reasons on the MCA384 DITI Carrier.

Adapter 96 DiTi 4to1 MCA384

The limitations for this head adapter are the same as “Adapter 96 DiTi MCA384”.

Adapter QC MCA384

This special head adapter is used to protect the pipetting head during transport and storage and is not intended for pipetting.

15.69.9 MCA384 Drop DITIs Command

The MCA384 Drop DITIs command is used to return the disposable tips of the multi channel arm to a specified position on the worktable of the pipetting instrument.

The MCA384 Drop DITIs command also allows you to drop one row or one column of DITIs in to a box of 384 DITIs. See 15.69.9.1 “Limitations for different head adapter types (dropping DITIs)”, 15-197 for more information.

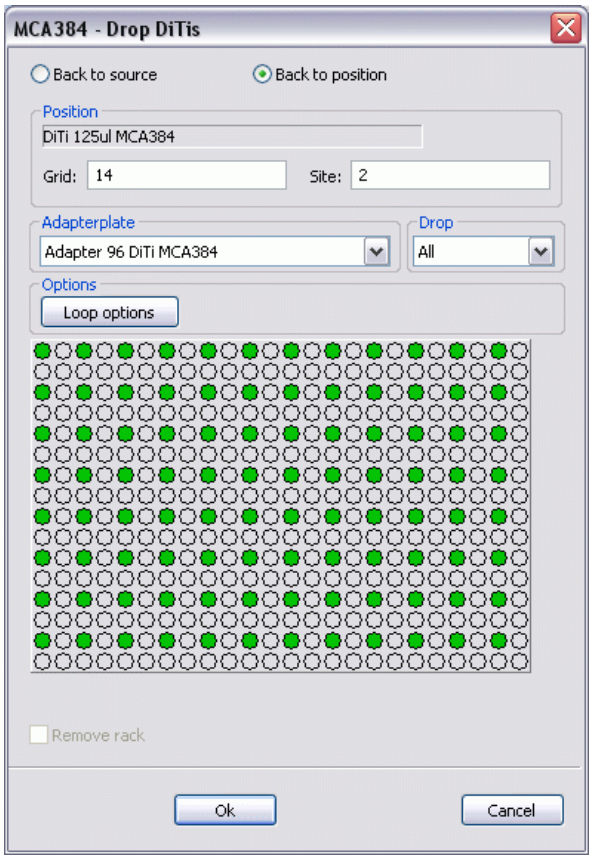

Fig. 15-129 *MCA384 Drop DITIs command*

The parameters of the MCA384 Drop DITIs command are as follows:

Back to source

This option returns the DITIs back to the grid and site position from where it was fetched with the MCA384 Get DITIs command.

Note: *If you switch off the pipetting instrument with the DITIs still attached, it will forget the grid and site position from where the DITIs were fetched. The option Back to source will then display an error message when the script is validated.*

Back to position

Specify the position where the MCA384 should return the DITIs by clicking on the MCA384 DITI rack in the Worktable Editor. The type or label (name), the grid position and the site of the DITI rack are then shown in the two fields. You must first put an MCA384 DITI rack in the Worktable Editor at the required position. The gray (protected) field then shows the type or the label (name) of the selected item.

MCA384 DITIs should not be discarded into the DITI waste. This can cause mechanical damage. They should be discarded into an MCA384 DITI rack.

Head adapter

DITIs are fitted to the MCA384 using a head adapter between the DITIs and the pipetting head. Choose the head adapter type which is currently fitted to the MCA384 pipetting head.

Drop

Specify whether you want to drop all DITIs, one column of DITIs or one row of DITIs. The available options in the pull-down list depend on the chosen head adapter and the type of the carrier where the DITIs are dropped. The one column or one row option allows you to specify where to drop the DITIs in the DITI rack. The DITI dropping mechanism is activated for all DITI positions simultaneously. Accordingly, you can only drop one row or one column of DITIs if the pipetting head is only fitted with one row or one column of DITIs. See also 15.69.8.1 “Limitations for different head adapter types (getting DITIs)”, 15-193.

Loop Options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Location

If the DITI Rack has more DITI positions than the number of DITIs you want to drop, you must click in the Location panel to select where to put down the DITIs. See also 15.69.8.1 “Limitations for different head adapter types (getting DITIs)”, 15-193.

Your settings are also used to assign pipetting information to the correct tip positions in report files created with the Export Data command.

Remove rack

This checkbox is only available in **Freedom EVOware Plus** and is intended for nested DITIs labware. This labware type uses a special DITI rack design with 96 DITIs which can be stacked to form a pile of racks. Check this checkbox if you want the Drop DITIs command to remove and discard the rack after putting down the DITIs. A special process is then started which carries out the following movements:

– The DITIs are put down on the pile of nested tips.
– The RoMa picks up the rack on the top of the pile together with the DITIs and discards them.

If you check this checkbox, you must choose a special DITI waste location for discarding the DITI racks and the DITIs. To do this, right click on a DITI waste on the worktable and choose *Waste for DITI racks* from the context menu. A tick alongside this context menu item shows that this location will then be used for the empty DITI racks. This option is only available for the DITI waste site of a DITI carrier with waste and is only intended for discarding empty DITI racks.

Freedom EVOware Standard: You must use a RoMa command if you want to discard the rack.

15.69.9.1 Limitations for different head adapter types (dropping DITIs)

The MCA384 has the following limitations when dropping DITIs:

Adapter DiTi Combo MCA384

You can drop all 384 DITIs if the DITI rack is on the MCA384 DITI Carrier but you cannot drop one row or one column. The latter option requires a relative movement of the pipetting head which is not possible for mechanical reasons on the MCA384 DITI Carrier.

You can drop all 384 DITIs or one row or one column of DITIS if the DITI rack is positioned on any of the other carrier types that allow the MCA384 DITI rack.

If you drop one row or one column of DITIs, you must use the Drop parameter in the Drop DITIs command to specify whether the DITIs are currently fitted to the first or last column (left or right side) or the first or last row (rear or front side) of the pipetting head. The Position parameter then lets you specify the row or column in the DITI rack where you want to put down the DITIs. This requires a relative movement of the pipetting head.

The DITI dropping mechanism is activated for all DITI positions simultaneously. Accordingly, you can only drop one row or one column of DITIs if the pipetting head is only fitted with one row or one column of DITIs.

Adapter DiTi MCA384

You can only drop all 384 DITIs. This can be done on any of the carrier types that allow the MCA384 DITI rack.

Adapter 96 DiTi MCA384

You can drop all 384 DITIs if the DITI rack is on the MCA384 DITI Carrier but you cannot drop one row or one column. The latter option requires a relative movement of the pipetting head which is not possible for mechanical reasons on the MCA384 DITI Carrier.

You can drop all 96 DITIs or one row or one column of DITIS into a box of 384 DITIs if the DITI rack is positioned on any of the other carrier types that allow the MCA384 DITI rack.

If you drop one row or one column of DITIs, you must use the Drop parameter in the Drop DITIs command to specify whether the DITIs are currently fitted to the first or last column (left or right side) or the first or last row (rear or front side) of the pipetting head. The Position parameter then lets you specify the row or column in the DITI rack where you want to put down the DITIs. This requires a relative movement of the pipetting head.

The DITI dropping mechanism is activated for all DITI positions simultaneously. Accordingly, you can only drop one row or one column of DITIs if the pipetting head is only fitted with one row or one column of DITIs.

Adapter 96 DiTi 4to1 MCA384

The limitations for this head adapter are the same as “Adapter 96 DiTi MCA384”.

Adapter QC MCA384

This special head adapter is used to protect the pipetting head during transport and storage and is not intended for pipetting.

Freedom EVOware also permits you to drop up to 384 DITIs from the 96-DITI or 384-DITI head adapters on to MCA384 DITI racks located on carrier types which are not specifically intended for the MCA384. Due to the high density of the MCA384 DITI rack, care should be taken to teach the positions accurately in this case. Carrier types which are specifically intended for the MCA384 include features to ensure a very high accuracy of the mechanical fit and position.

15.69.10 MCA384 Move Command

The MCA384 Move command is used to move the MCA384 from one position to another without performing an Aspirate or Dispense operation:

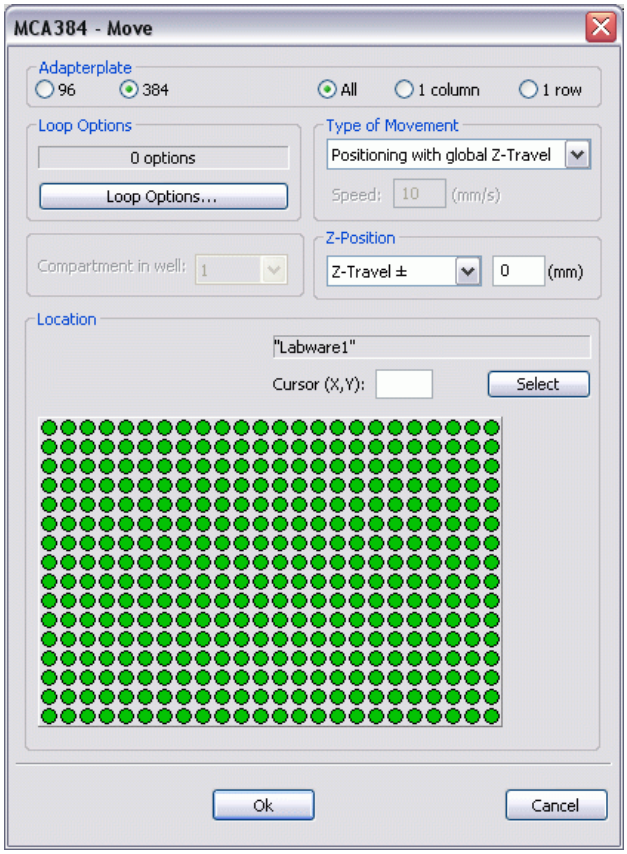

Fig. 15-130 *MCA384 Move command*

The parameters of the MCA384 Move command are as follows:

Head adapter

Choose the number of tips on the head adapter which was picked up by the previous MCA384 Get Head Adapter command. In addition, you can choose to move all tips, one column of tips or one row of tips.

Loop options

If you are using the command in a script loop, click this button if you want to specify loop options. This allows you to use a different column, row and/or labware item for each cycle of the loop. The gray (protected) field shows the number of loop options you have chosen. See 14.4 “Loop Options”, 14-23.

Type of movement

Choose X-Move, Y-Move or Z-Move to move only one axis of the MCA384. You can then specify the speed of the movement.

The options *Positioning with global Z-travel*, *Positioning with local Z-travel* and *Positioning with advanced Z-travel* move the MCA384 to the labware at maximum speed. Note: Z-travel is the tip height which is used during the arm movement.

To use the option *Positioning with advanced Z-travel,* you must activate this feature in the Configuration Tool (see 8.4.2.11 “MCA384”, 8-34). If you do not activate this feature, *Positioning with advanced Z-travel* has the same effect as *Positioning with global Z-travel*.

Z-Position

Unless you have chosen X-Move or Y-Move in the *Type of Movement* field, you can specify the Z-Position to which the tips should be lowered at the end of the MCA384 movement. Choose the required Z-position and then specify a Z offset in mm if required. A positive value for the offset lowers the tips.

Compartment in well

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size. Choose the compartment which you want to use for pipetting (the main compartment is normally compartment 1). Well compartments are specified in the labware configuration. This field is inactive (gray) if the well only has one compartment.

Location

Select the labware which you want to use by clicking on the labware in the Worktable Editor. The gray (protected) field at the top right of the Location panel shows the label (name) of the labware that you have selected (it shows a generic name if you have not assigned a label).

If the MCA384 pipetting head has less tips fitted than the number of wells in the labware (or you have clicked the radio button 1 column or 1 row), you must then click in the Location panel to select the set of wells you want to use. This is not necessary if the pipetting head has the same number of tips as the number of wells in the labware. Your well selection is shown in green.

Cursor (x,y)

You can also select wells by entering the x coordinate (from left to right) and the y coordinate (from top to bottom) of the top left well you want to select. Tip: The x and y coordinates of each well are shown in a tool tip if you move the cursor over the well area in the Location panel.

Select: Click this button to select the wells you have specified in the Cursor (x,y) field. This button has no effect if your well selection does not fit within the well area of the labware. In addition, it has no effect if the pipetting head has the same number of tips as the number of wells in the labware.

15.69.11 MCA384 Vector Command

The MCA384 Vector command executes a CGM vector, which is a predefined sequence of CGM movements. You can also specify gripper actions at the Safe and End positions. This command requires the CGM (common gripper module), which is a hardware option for the MCA384.

CGM vectors are very similar to RoMa vectors. See 9.6.1 “Using RoMa Vectors”, 9-58. The main difference is that when you teach CGM vectors you must also specify the Y position of the MCA384 pipetting head. Freedom EVOware needs this information to ensure that the CGM will not collide with the MCA384 as it moves.

The MCA384 Vector command can only be carried out when the CGM Is undocked from the MCA384 pipetting head (see 15.69.13 “MCA384 Dock CGM Command”, 15-204). If the CGM is currently docked, it is undocked automatically (and left undocked when the Vector command is completed). Use the Dock CGM command if you want to dock it again.

The MCA384 Vector command is intended for special MCA384 movements and not for moving labware from one position to another - you should use the MCA384 Transfer Labware command instead for this purpose. See 15.58.1 “Moving labware with the RoMa Vector command”, 15-142 for additional information which is also applicable to the MCA384.

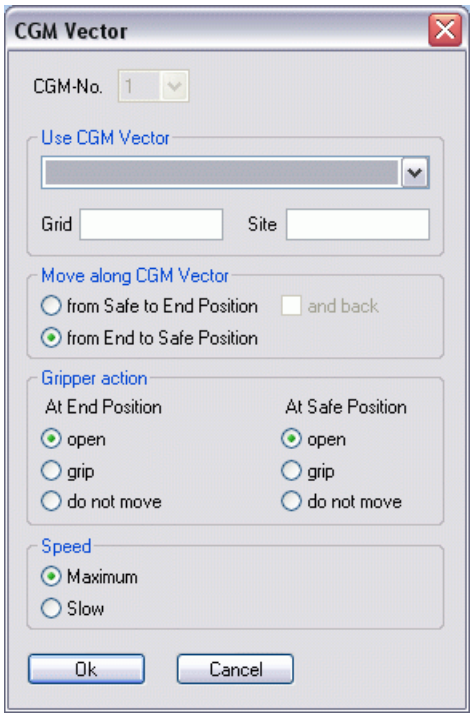

Fig. 15-131 *MCA384 Vector command*

The parameters of the MCA384 Vector command are as follows:

CGM-No.

The pull-down list is gray (inactive) and preset to 1 because current Freedom EVO pipetting instruments can only be fitted with one MCA384 and CGM.

Use CGM Vector

Choose the CGM vector you want to use for the movement. The popup list shows the CGM vectors which are currently defined in the Freedom EVOware database.

Then specify the grid position and carrier site for which the vector is intended. The Grid field is protected (gray) if you have chosen a vector for a device which is not positioned on the worktable (see Carrier is Device checkbox in the carrier definition).

Tip: If you click on a carrier, the current grid position is shown in the small yellow tab at the bottom left.

Move along CGM Vector

Choose the required direction of the CGM movement. Click *And back* if you want the CGM to return to the Safe position after reaching the End position.

Gripper action

Choose the gripper action which should be executed at the Safe position and at the End position. The required gripper spacing to pick up and release the labware is taken from the Grip Width and Release Width parameters in the chosen CGM vector.

Speed

Choose *Maximum* if you want the CGM to move at maximum speed. Choose *Slow* if you want the CGM to move at the speed specified in the CGM vector.

15.69.12 MCA384 Transfer Labware Command

The MCA384 Transfer Labware command is used to transfer labware (e.g. a microplate) from one position to another with the CGM. This command requires the CGM (common gripper module), which is a hardware option for the MCA384.

If you have scanned the labware barcode and you move the labware with the MCA384 Transfer Labware command, the barcode remains assigned to the labware (i.e. the labware data record) at the new location. In addition, pipetting information, if any, remains assigned to the labware (see 15.26 “Export Data Command”, 15-48).

CGM vectors are very similar to RoMa vectors. See 9.6.1 “Using RoMa Vectors”, 9-58. The main difference is that when you teach CGM vectors you must also specify the Y position of the MCA384 pipetting head. Freedom EVOware needs this information to ensure that the CGM will not collide with the MCA384 as it moves.

The MCA384 Transfer Labware command can only be carried out when the CGM is undocked from the MCA384 pipetting head (see 15.69.13 “MCA384 Dock CGM Command”, 15-204). If the CGM is currently docked, it is undocked automatically (and left undocked when the Transfer Labware command is completed). Use the Dock CGM command if you want to dock it again.

Grip and release commands for the CGM (used to pick up and put down the labware) are handled automatically. The required gripper spacing is taken from the advanced properties for the respective labware type (see 9.4.2 “Editing Labware, Advanced Tab”, 9-22).

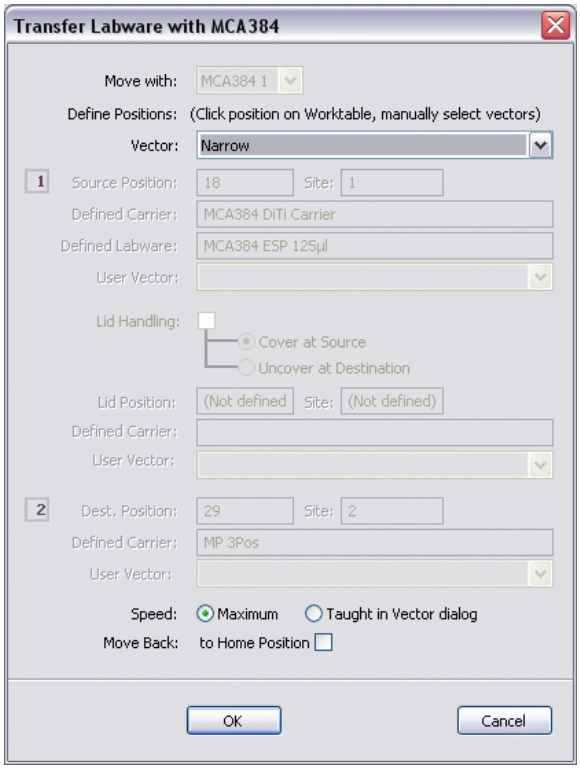

Fig. 15-132 *MCA384 Transfer Labware command*

The parameters of the MCA384 Transfer Labware command are as follows:

Move with

The pull-down list is gray (inactive) and preset to MCA384 1 because current Freedom EVO pipetting instruments can only be fitted with one MCA384 and CGM.

Vector

Choose the CGM vector that you want to use to transfer the labware.

Choose Narrow to pick up the labware on the narrow side; choose Wide to pick up the labware on the wide side.

Choose User defined (Narrow) or (Wide) to pick up the labware on the narrow or wide side with a **user-defined vector**. In this case, you must choose the user-defined vector to use for picking up the labware at the source position and putting down it at the destination position in the two *User Vector* pull-down lists. User-defined vectors are created in the Control Bar (Robot Vectors section). See 5.4.1.6 “Robot Vectors”, 5-12.

Above all if you did not create the user-defined vector yourself, we recommend you to check carefully that the vector moves the MCA384 to the correct (i.e. intended) source and destination carrier positions before using it for pipetting. Tip: Test the CGM vector in a script using the 3D simulation program EVOSim.

Freedom EVOware will report an error when you complete the Transfer Labware command if the narrow or wide CGM vector has not yet been created for the chosen labware type. It is best to create the required CGM vector in advance. CGM vectors are very similar to RoMa vectors (see 9.6.2 “Teach Plate Robot Vector Dialog Box”, 9-59).

⌦ Transfer Labware command, Step 1

Specify the parameters for the source position:

Source position

Select the current position of the labware by clicking on it in the Worktable Editor.

Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site and the gray (protected) field *Defined Labware* shows the type of labware at the chosen site.

If you want to fetch the labware from a device such as a hotel or barcode scanner, click on the device icon. You then need to choose the site and the labware type. The list shows labware types which are allowed for the device (see 9.5 “Configuring Carriers”, 🗎 9-39, “Allowed Labware on this carrier”).

⌦ Transfer Labware command, Step 2

Specify the parameters for the labware lid. These parameters are only available for labware types which can be fitted with a lid:

Lid handling

Check this checkbox if the labware has a lid. Choose *Cover at source* if you want to put on the lid before moving the labware. Choose *Uncover at destination* if you want to remove the lid after moving the labware to the destination position (i.e. the lid was already present). In either case, select the position for fetching or putting aside the lid by clicking on the site in the Worktable Editor. Grid and Site then show the position you have chosen. The gray (protected) field Defined Carrier shows the type of carrier on which the lid is placed/will be placed. You can only put aside lids on unused carrier sites.

⌦ Transfer Labware command, Step 3

Specify the parameters for the destination position:

Destination Position

Select the required destination position of the labware by clicking on the site in the Worktable Editor.

The destination site must be suitable for the labware type you are moving (see 9.5 “Configuring Carriers”, 🗎 9-39, “Allowed labware on this carrier”).

Grid and Site then show the position you have chosen. The gray (protected) field *Defined Carrier* then shows the type of carrier at the chosen site.

If you want to move the labware to a device such as a hotel or barcode scanner, click on the device icon. You then need to choose the site and the labware type. The list shows labware types which are allowed for the device (see 9.5 “Configuring Carriers”, 🗎 9-39, “Allowed Labware on this carrier”).

Speed

Choose *Maximum* if you want the CGM to move at maximum speed. Choose *Taught in vector dialog* if you want the CGM to move at the speed specified in the CGM vector.

Move back to Home Position

Check this checkbox if you want the CGM to move back to its home (parking) position after transferring the labware. See 9.6.4 “Defining the Home Position for a RoMa”, 🗎 9-62.

15.69.13 MCA384 Dock CGM Command

The MCA384 Dock CGM command is used to dock the CGM around the MCA384 pipetting head. This reduces the amount of space required by the MCA384/CGM hardware in the X direction. The CGM (common gripper module) is a hardware option for the MCA384 which can be used to pick up and move labware. The CGM can only be used for gripping and moving labware when it is undocked. Commands which use the CGM initiate the undocking operation automatically, if necessary.

If sufficient space is available on the worktable, the CGM can be kept permanently undocked to avoid the time needed for undocking when the CGM is used. This speeds up commands which use the CGM.

To dock the CGM, the gripper fingers are lowered below the MCA384 pipetting head, opened completely and rotated until they point to the left. The grippers are then raised again until the pipetting head is positioned centrally between the fingers. When docked, the CGM always moves together with the pipetting head, and the pipetting head can be moved as if the CGM is not mounted. Tip: You can test and view docking and undocking using the 3D simulator EVOSim.

Freedom EVOware Plus: The CGM is docked and undocked automatically, if necessary (see 8.5.13.2 “MCA384 Configuration - Settings Tab”, 8-66, Dock CGM after move).

15.69.14 MCA384 Undock CGM Command

The MCA384 Undock CGM command is used to undock the CGM from the MCA384 pipetting head. The CGM (common gripper module) is a hardware option for the MCA384 which can be used to pick up and move labware. The CGM can only be used for gripping and moving labware when it is undocked. Commands which use the CGM initiate the undocking operation automatically, if necessary.

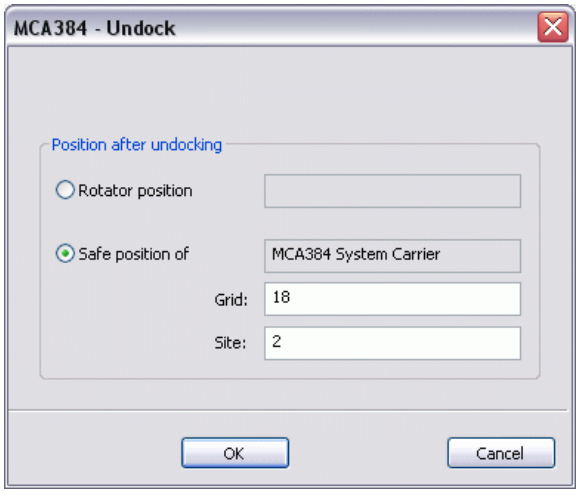

Fig. 15-133 *MCA384 Undock CGM command*

The parameters are as follows:

Position after undocking panel

Rotator position

Specify the required angle of the grippers after undocking (in 0.1 degrees steps).

Safe position of

Specify the required safe position manually (specify grid and site) or click on a “safe” carrier in the Worktable Editor. The gray (protected) field then shows the name of the carrier you have chosen.

If sufficient space is available on the worktable, the CGM can be kept permanently undocked to avoid the time needed for undocking when the CGM is used. This speeds up commands which use the CGM.

To dock the CGM, the gripper fingers are lowered below the MCA384 pipetting head, opened completely and rotated until they point to the left. The grippers are then raised again until the pipetting head is positioned centrally between the fingers. When docked, the CGM always moves together with the pipetting head, and the pipetting head can be moved as if the CGM is not mounted. Tip: You can test and view docking and undocking using the 3D simulator EVOSim.

Freedom EVOware Plus: The CGM is docked and undocked automatically, if necessary (see 8.5.13.2 “MCA384 Configuration - Settings Tab”, 8-66, Dock CGM after move).

15.70 CNS SendNotification command

The Common Notification Server (CNS) is a central Tecan software component which is responsible for sending notification messages. The SendNotification command is used to send a message to one or more recipients:

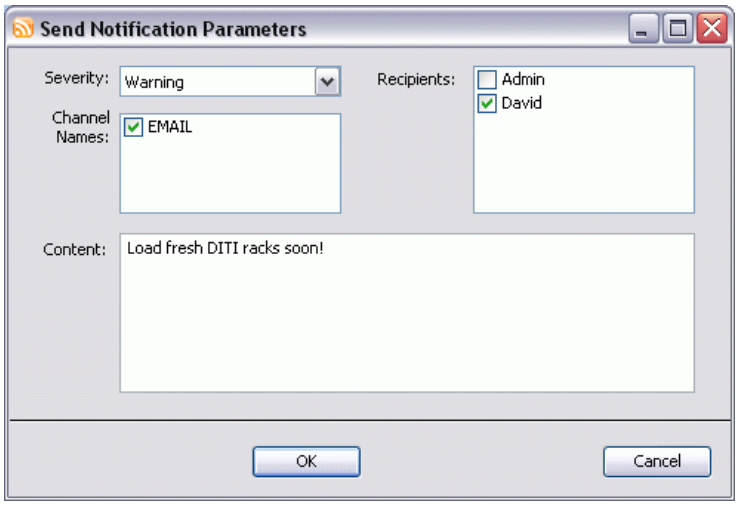

Fig. 15-134 *CNS SendNotification command*

The Recipients panel only shows Freedom EVOware users whose eMail address has already been configured with the CNS Configuration Tool (see A.12.2 “CNS Configuration Tool”, A-84). The messages which are sent are also shown in the CNS web server (see A.12.1 “CNS Web Server”, A-83).

The parameters of the SendNotification command are as follows:

Severity

Choose the required severity of the message (comment, information, warning or error). Depending on the recipient's eMail software, the chosen severity is shown in the "message priority" or "message severity" column or field in the eMail software. In the CNS web server, the messages are shown accordingly on the Warnings, Errors and Infos tabs.

Channel names

Choose one or more communication channels, as required. Currently, the CNS SendNotification command only supports the communication channel "Email".

Recipients

Check one or more checkboxes to choose the required recipients of the message. The Recipients panel only shows Freedom EVOware users whose eMail address has already been configured with the CNS Configuration Tool (see A.12.2 "CNS Configuration Tool", A-84).

Content

Enter the required text of the message.

16 Device Commands

This chapter contains detailed descriptions of the Freedom EVOware device commands.

Freedom EVOware Plus

In Freedom EVOware Plus, when the Script Editor is open the Commands tab only shows script commands (commands which are used for writing pipetting scripts, see 13.1 “Overview of Script Commands”, 🗎 13-1). When the Process Editor is open, the Commands tab of the Control Bar only shows device commands (commands for the optional devices, see 13.2 “Overview of Device Commands”, 🗎 13-12).

Freedom EVOware Standard

In Freedom EVOware Standard, the Control Bar always shows both command types (it does not have a Process Editor).

If you cannot find the device that you want to use in the Control Bar, you must run the installation program again and install the respective device driver (see 4.3 “Modifying, Removing or Repairing Your Installation”, 🗎 4-8). Also check whether the driver has been installed but is currently deactivated (see 8.4.1.1 “Device Information Tab”, 🗎 8-21, *Start* checkbox).

Note: *Some of the device commands which are described in this chapter are not shown at all in the Control Bar. Such commands are used internally, e.g. for configuring pre-actions and post-actions.*

16.1 Service Functions

Some or all of the commands for each device can be executed manually from the Control Bar (without running a process) for service purposes, e.g. to initialize the device manually or to test correct functioning. To run a device command manually, right-click on the command name in the Commands section of the Control Bar and choose **Run Command** from the context menu.

Before executing a command for service purposes, make sure that the pipetting instrument and/or the device is set up appropriately. For example, some of the commands require you to put a microplate onto one or more carriers and/or into the device.

See 6.4.2 “Run Maintenance”, 🗎 6-10 for information on instrument maintenance functions. Maintenance functions are scripts which are created using the Script Editor.

16.2 Commands for the Symbol LS-1220 Barcode Scanner

The Symbol LS-1220 barcode scanner option allows you to read barcodes on plates or tubes which are presented to the scanner by a plate or tube robot. It can perform several reading attempts and tell the robot to increase its range of motion in front of the laser beam each time to detect barcodes even if they are not precisely positioned in front of the laser beam at the first try.

In Freedom EVOware Plus, the Barcode Scanner - Read Barcode command is an on-the-fly-command – drag the command to the line which connects two process steps (see 5.4.3 “The Process Editor (Freedom EVOware Plus)”, 🗎 5-17).

16.2.1 Barcode Scanner - Read Barcode Command

The Read Barcode command is used to read barcodes from the labware or tube which is presented to the barcode scanner by the RoMa. The RoMa moves the labware or tube in front of the scanner in x, y and z direction according to the driver settings you have made. The scanner driver can be configured to re-scan several times if the labware or tube barcode cannot be read on the first attempt. It increases the distance of movement of the labware or tube along the three axes each time to increase the likelihood of finding the barcode. If a timeout occurs, the user will either be prompted to specify a barcode manually or a default barcode will be constructed, again depending on the driver configuration. See 8.5.1 “Settings for the Barcode Scanner”, 🗎 8-39 for details.

See 13.2.1 “Commands for the Barcode Scanner, Overview”, 🗎 13-12 for general information on using the Read Barcode command.

Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.26 “Export Data Command”, 🗎 15-48).

This command has no execution parameters or objects, pre-actions or post-actions.

16.3 Commands for the Carousel

The carousel is a motor-driven magazine system which is used to store microplates, tube racks or DITI racks and to present them to the instrument for pipetting operations. Each carousel can have 1 to 9 towers. The labware is removed from the carousel and re-inserted using the plate robot. The carousel can be fitted with a barcode scanner which can read barcode labels on plates when they are inserted and removed. The carousel can be used like any other microplate hotel on your pipetting instrument.

The carousel must be subdivided into several logical carousels if you want to use it to store a mixture of labware types with different dimensions. See 9.5.5.3 “Carousel Carrier Attributes”, 🗎 9-50 for more information.

16.3.1 Carousel - PresentPlate Command

The PresentPlate command gets labware from the carousel. The labware is brought to the carousel transfer position where the plate robot can pick it up and move it away.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

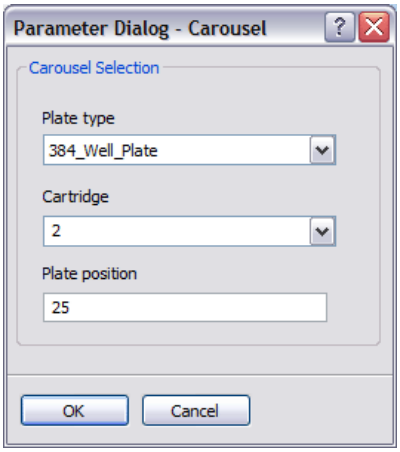

Fig. 16-1 *Carousel - PresentPlate command*

Carousel Selection panel

Plate type

Choose the labware type that you want to use with this command. This tells the carousel the labware dimensions and how to handle the labware correctly.

Cartridge

Specify the carousel cartridge (tower) containing the labware that you want.

Plate position

Specify the current labware position in the tower or the name of a numeric variable. Plates are counted from top to bottom.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.3.2 Carousel - PreReturnPlateByBC Command

The PreReturnPlateByBC command moves the carousel's plate handler to the carousel transfer position where it waits for the RoMa to bring the labware which you want to return to the carousel. It is used together with the ReturnPlateByBarcode command.

The following sequence of commands must be used to return labware to its orginal position in the carousel:

- Carousel - PreReturnPlateByBC
- RoMa - Transfer Labware
- Carousel - ReturnPlateByBarcode

The Carousel - EndAccess command is not required in this case.

See 16.3.4 "Carousel - ReturnPlateByBarcode Command", 16-4 for more information.

16.3.3 Carousel - ReturnPlate Command

The ReturnPlate command returns labware from the carousel transfer position to the specified tower and position in the carousel.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

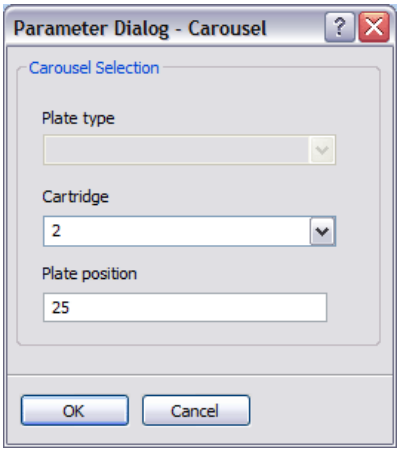

Fig. 16-2 *Carousel ReturnPlate command*

Carousel Selection panel

Cartridge

Specify the carousel cartridge (tower) where the labware should be put.

Plate position

Specify the required labware position in the tower or the name of a numeric variable. Plates are counted from top to bottom.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.3.4 Carousel - ReturnPlateByBarcode Command

The ReturnPlateByBarcode command returns labware from the carousel transfer position to its original position in the carousel.

To use this command, before getting labware from the carousel you must scan the barcodes of all of the labware in the carousel with the ReadAllBarcodes or ReadPlatesInCartridge command. The carousel driver then creates an internal table with information on which labware is stored in which position This allows the carousel to keep track of the orginal position of barcoded labware which has been removed.

The ReturnPlateByBarcode command must be preceded by the PreReturnPlateByBC command. The following sequence of commands must be used to return labware to its orginal position in the carousel:

- Carousel - PreReturnPlateByBC
- RoMa - Transfer Labware
- Carousel - ReturnPlateByBarcode

The Carousel - EndAccess command is not required in this case.

When the ReturnPlateByBarcode command is executed, the carousel handler moves the labware into the carousel, moves back to the transfer position and moves in again. The double movement is necessary for mechanical reasons.

16.3.5 Carousel - ReadAllBarcodes command

The ReadAllBarcodes command reads the barcodes of all of labware in the carousel. Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.26 “Export Data Command”, 15-48).
In addition, the carousel driver writes the scanned barcodes to a text file (see A.2.1 “Barcode files written by the Carousel commands”, A-11).

Note: *If the carousel cartridge is configured for the maximum number of slots (labware positions) which are physically possible, for mechanical reasons the barcode scanner may not be able to scan the barcode of the labware in the topmost slot.*

This command has no execution parameters or objects, pre-actions or post-actions.

16.3.6 Carousel - InitCarousel Command

The InitCarousel command initializes the carousel. You must initialize the hardware with this command before you use the other commands for this device.
This command has no execution parameters or objects, pre-actions or post-actions.

16.3.7 Carousel - MoveToCartridge Command

The MoveToCartridge command rotates the carousel to a specified tower.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

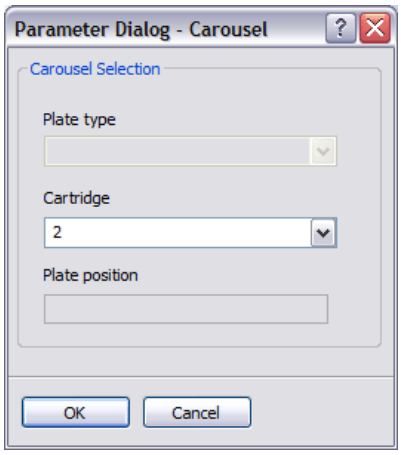

Fig. 16-3 *Carousel MoveToCartridge command*

Carousel Selection panel

Cartridge

Specify the cartridge (tower) to which the carousel should be rotated.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.3.8 Carousel - EndAccess Command

The EndAccess command completes the current carousel movement. This command is necessary after each PresentPlate, PresentPlateByBarcode and ReturnPlate command.

This command has no execution parameters or objects, pre-actions or post-actions.

16.3.9 Carousel - ReadPlatesInCartridge Command

The ReadPlatesInCartridge command reads the barcodes of all of the labware in the specified cartridge (tower) of the carousel. Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.26 “Export Data Command”, 15-48).

In addition, the carousel driver writes the scanned barcodes to a text file (see A.2.1 “Barcode files written by the Carousel commands”, A-11).

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

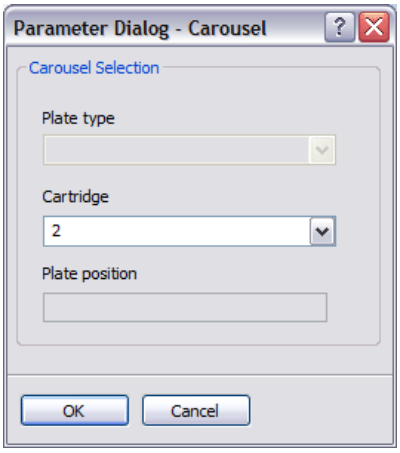

Fig. 16-4 *Carousel ReadPlatesInCartridge command*

Carousel Selection panel

Cartridge

Specify the carousel cartridge (tower) where the barcodes should be read.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Note: *If the carousel cartridge is configured for the maximum number of slots (labware positions) which are physically possible, for mechanical reasons the barcode scanner may not be able to scan the barcode of the labware in the topmost slot.*

16.3.10 Carousel - PresentPlateByBarcode Command

The PresentPlateByBarcode command gets the labware with the specified barcode from the carousel. The labware is brought to the carousel transfer position where the plate robot can pick it up and move it away.
Before this command is executed, you must scan the barcodes of all of the labware in the carousel with the ReadAllBarcodes or ReadPlatesInCartridge command. The carousel driver then creates an internal table with information on which labware is stored in which position.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

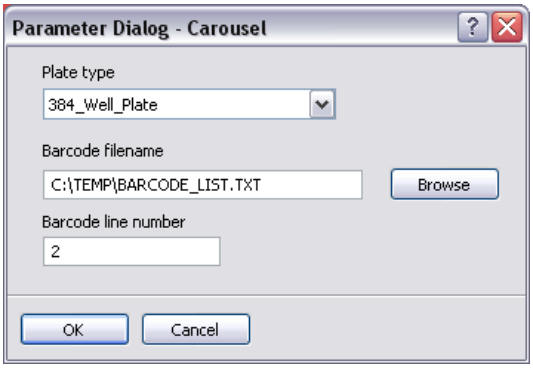

Fig. 16-5 *Carousel PresentPlateByBarcode command*

Plate type
Choose the labware type that you want to use with this command. This tells the carousel the labware dimensions and how to handle the labware correctly.

Barcode
Enter the name of a text file containing the barcode of the labware you want or click Browse and choose an existing file. The text file can contain more than one barcode (see Barcode line number). Each barcode must be on a new line.

Barcode line number
If the text file contains more than one barcode, specify the line number which contains the barcode.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.3.11 Carousel - PrePresentPlate Command

The PrePresentPlate command brings the next labware item to be processed from the carousel tower to the transfer position where it can be picked up by the

RoMa during idle time. The RoMa then does not have to wait for the labware to be brought from the tower. This optimizes the movement times for the carousel. This command is mainly intended for internal use by Freedom EVOware.

Objects

The PrePresentPlate command operates on a labware item of type *Object* or a derived type with default name *MP*.

16.3.12 Carousel - UndoPrePresent Command

The UndoPrePresent command cancels the pre-unloading of plates. This command is only used by Freedom EVOware internally.

This command has no execution parameters or objects, pre-actions or post-actions.

16.3.13 Carousel - LoadBCFromFile Command

The LoadBCFromFile command reads a list of barcodes from a text file and assigns them to the labware in the carousel.

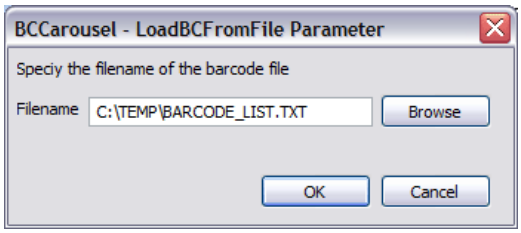

Fig. 16-6 *Carousel LoadBCFromFile command*

Filename

Enter the name of a text file containing the barcodes you want to assign to the labware or click Browse and choose an existing file. See A.2.1.1 “Barcode files read by the Carousel commands”, A-12 for information on the required structure of the barcode file.

16.4 Commands for the Carousel NT

The carousel is a motor-driven magazine system which is used to store microplates, tube racks or DITI racks and to present them to the instrument for pipetting operations. Each carousel can have 1 to 9 towers. The labware is removed from the carousel and re-inserted using the plate robot. The carousel can be fitted with a barcode scanner which can read barcode labels on plates when they are inserted and removed. The carousel can be used like any other microplate hotel on your pipetting instrument.

The Carousel NT supersedes the standard carousel and features a number of electrical and mechanical improvements, including faster operation and safety doors which can be fitted with doorlocks.

The carousel must be subdivided into several logical carousels if you want to use it to store a mixture of labware types with different dimensions. See 9.5.5.4 “Carousel NT Carrier Attributes”, 🗎 9-52 for more information.

16.4.1 Carousel NT - OpenDoorlock command

The OpenDoorlock command unlocks the doorlocks of the carousel safety door. This command can be used e.g. if you want to open the door when a script or process is running to allow the operator to insert a cartridge with new labware. For safety reasons, you must pause the script or process with the User Prompt command directly after you unlock the doorlocks. Furthermore, you must lock the doorlocks again with the CloseDoorlocks command when the operator has replaced the cartridge (see 16.4.2 “Carousel NT - CloseDoorlock command”, 🗎 16-9).

This command has no execution parameters or objects, pre-actions or post-actions.

16.4.2 Carousel NT - CloseDoorlock command

The CloseDoorlock command locks the doorlocks of the carousel safety door. The door must be locked again after a preceeding OpenDoorlocks command (see 16.4.1 “Carousel NT - OpenDoorlock command”, 🗎 16-9). It is is not necessary to use this command at the beginning of your script - for safety reasons, all doorlocks are locked automatically when a pipetting script or process is started.

This command has no execution parameters or objects, pre-actions or post-actions.

16.4.3 Carousel NT - VerifyCartridges command

The VerifyCartridges command is used to check that the correct cartridge types have been loaded in the carousel. The cartridge types are specified in the carousel configuration (8.5.3.2 “Carousel NT Configuration - Hotel - Cartridge Configuration Tab”, 🗎 8-46). The carousel identifies the cartridges which have been loaded by scanning the cartridge barcode (this is not the same as the labware barcode). An error message will be output if the wrong cartridge type has been loaded or the cartridge barcode is missing or unreadable.

This command can be used at the start of your script or process or in a maintenance script. Alternatively, right-click the VerifyCartridges command in the Control Bar and choose Run Command in the context menu.

This command has no execution parameters or objects, pre-actions or post-actions.

16.4.4 Carousel NT - ScanAllCartridges command

The ScanAllCartridges command reads the barcodes of all of labware in the carousel. Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.26 “Export Data Command”, 🗎 15-48).

In addition, the carousel driver writes the scanned barcodes to a text file (see A.2.1 “Barcode files written by the Carousel commands”, 🗎 A-11).

This command has no execution parameters or objects, pre-actions or post-actions.

16.4.5 Carousel NT - ScanCartridge Command

The ScanCartridge command reads the barcodes of all of the labware in the specified cartridge (tower) of the carousel. Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.26 “Export Data Command”, 15-48).

In addition, the carousel driver writes the scanned barcodes to a text file (see A.2.1 “Barcode files written by the Carousel commands”, A-11).

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

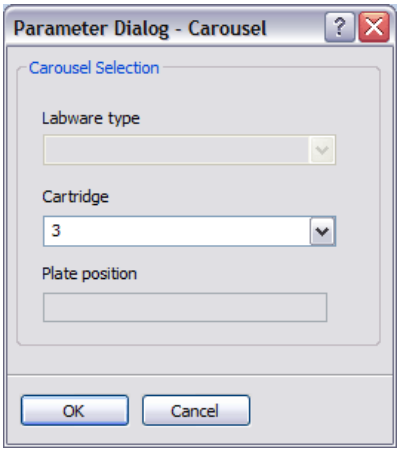

Fig. 16-7 *Carousel NT ScanCartridge command*

Carousel Selection panel

Cartridge

Specify the carousel cartridge (tower) where the barcodes should be read.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.4.6 Carousel NT - ScanLocation Command

The carousel must be subdivided into several logical carousels (separate sets of towers) if you want to use it to store a mixture of labware types with different dimensions. Each of the logical carousels must have a unique name. See 9.5.5.4 “Carousel NT Carrier Attributes”, 9-52 for more information.

The ScanLocation command reads the barcodes of all of the labware in the specified logical carousel. For example, if you have only exchanged the labware in towers 1 to 4, this command allows you to scan these towers only. The ScanLocation command is only meaningful if the carousel has been subdivided.

Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.26 “Export Data Command”, 15-48).
In addition, the carousel driver writes the scanned barcodes to a text file (see A.2.1 “Barcode files written by the Carousel commands”, A-11).

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

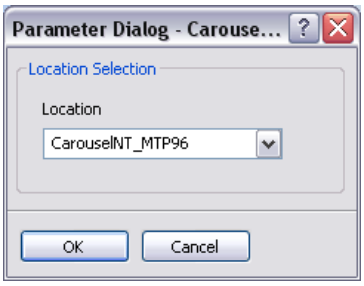

Fig. 16-8 *Carousel NT ScanLocation command*

In the above example, a logical carousel has been created with the name CarouselNT_MTP96. In this example, towers 1 to 4 will be used to store microplates. The other towers will be used to store DITI racks. The above ScanLocation command will only scan towers 1 to 4.

Carousel Selection panel

Location

Choose the logical carousel (set of towers) where the barcodes should be read. If you have not subdivided the carousel into logical carousels, the pull-down list will only have one entry; the ScanLocation command will scan all of the cartridges (towers) in this case.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.4.7 Carousel NT - PresentPlate Command

The PresentPlate command gets labware from the carousel. The labware is brought to the carousel transfer position where the plate robot can pick it up and move it away.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

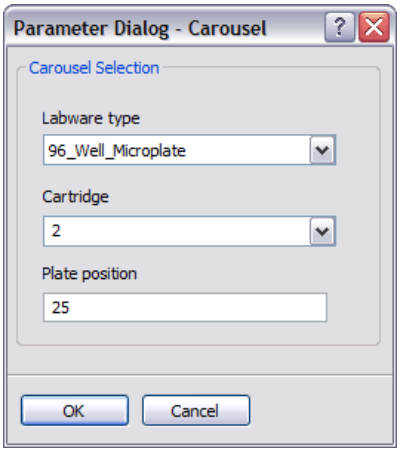

Fig. 16-9 *Carousel NT PresentPlate command*

Carousel Selection panel

Plate type

Choose the labware type that you want to use with this command. This tells the carousel the labware dimensions and how to handle the labware correctly.

Cartridge

Specify the carousel cartridge (tower) containing the labware that you want.

Plate position

Specify the current labware position in the tower or the name of a numeric variable. Plates are counted from top to bottom.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.4.8 Carousel NT - ReturnPlate Command

The ReturnPlate command returns labware from the carousel transfer position to the specified tower and position in the carousel.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

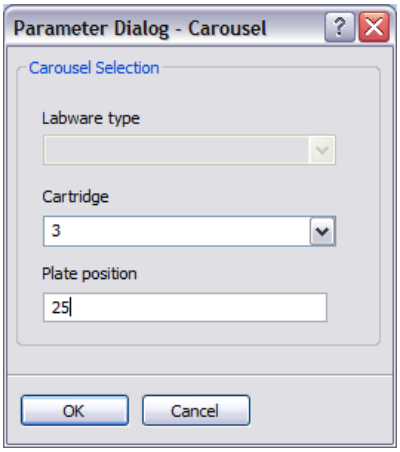

Fig. 16-10 *Carousel NT ReturnPlate command*

Carousel Selection panel

Cartridge

Specify the carousel cartridge (tower) where the labware should be put.

Plate position

Specify the required labware position in the tower or the name of a numeric variable. Plates are counted from top to bottom.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.4.9 Carousel NT - PresentPlateByBC Command

The PresentPlateByBC command gets the labware with the specified barcode from the carousel. The labware is brought to the carousel transfer position where the plate robot can pick it up and move it away.

Before this command is executed, you must scan the barcodes of all of the labware in the carousel with the ScanAllCartridges or ScanCartridge command. The carousel driver then creates an internal table with information on which labware is stored in which position.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

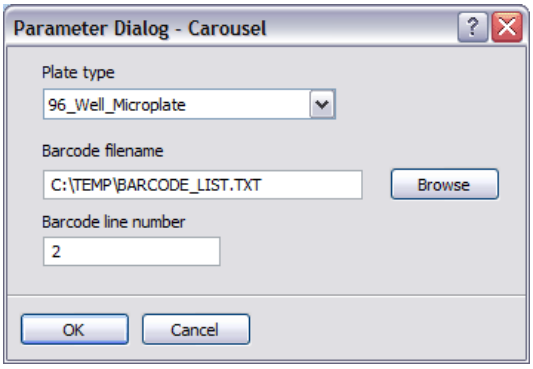

Fig. 16-11 *Carousel NT PresentPlateByBarcode command*

Plate type

Choose the labware type that you want to use with this command. This tells the carousel the labware dimensions and how to handle the labware correctly.

Barcode file name

Enter the name of a text file containing the barcode of the labware you want or click Browse and choose an existing file. The text file can contain more than one barcode (see Barcode line number). Each barcode must be on a new line.

Barcode line number

If the text file contains more than one barcode, specify the line number which contains the barcode.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.4.10 Carousel NT - ReturnPlateByBC Command

The ReturnPlateByBC command returns labware from the carousel transfer position to its original position in the carousel.

To use this command, before getting labware from the carousel you must scan the barcodes of all of the labware in the carousel with the ScanAllCartridges or ScanCartridge command. The carousel driver then creates an internal table with information on which labware is stored in which position This allows the carousel to keep track of the orginal position of barcoded labware which has been removed.

When the ReturnPlateByBarcode command is executed, the carousel handler moves the labware into the carousel, moves back to the transfer position and moves in again. The double movement is necessary for mechanical reasons.

16.4.11 Carousel NT - MoveToCartridge Command

The MoveToCartridge command rotates the carousel to a specified tower.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

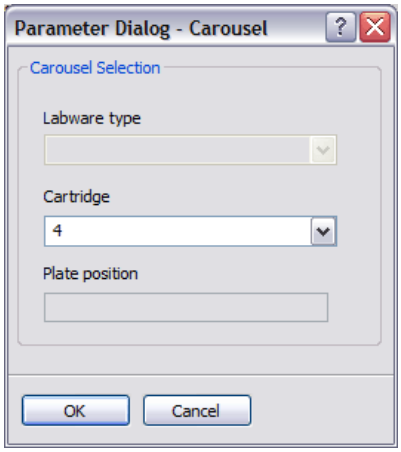

Fig. 16-12 *Carousel NT MoveToCartridge command*

Carousel Selection panel

Cartridge

Specify the cartridge (tower) to which the carousel should be rotated.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.4.12 Carousel NT - Initialize Command

The Initialize command initializes the carousel and locks the doorlocks of the safety door. Freedom EVOware normally initializes the carousel automatically at the appropriate time. This command is intended for special applications.

This command has no execution parameters or objects, pre-actions or post-actions.

16.4.13 Carousel NT - Shutdown Command

The Shutdown command shuts down the carousel and locks the doorlocks of the safety door. Freedom EVOware normally shuts down the carousel automatically at the appropriate time. This command is intended for special applications.

This command has no execution parameters or objects, pre-actions or post-actions.

16.4.14 Carousel NT - PrePresentPlate Command

The PrePresentPlate command moves the next labware item to be processed to the carousel transfer position where it can be picked up by the robot during idle time. The robot then does not have to wait for the labware to be presented. This optimizes the movement times for the carousel. This command is mainly intended for internal use by Freedom EVOware.

Objects

The PrePresentPlate command operates on a labware item of type *Object* or a derived type with default name *MP*.

16.4.15 Carousel NT - UndoPrePresent Command

The UndoPrePresent command cancels the pre-unloading of plates.
This command has no execution parameters or objects, pre-actions or post-actions.

16.4.16 Carousel NT - LoadBCFromFile Command

The LoadBCFromFile command reads a list of barcodes from a text file and assigns them to the labware in the carousel.

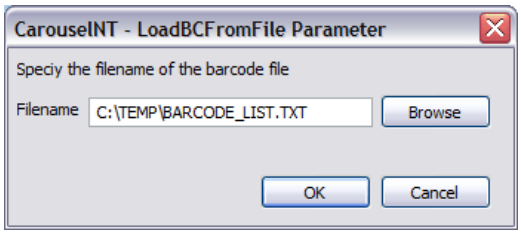

Fig. 16-13 *Carousel NT LoadBCFromFile command*

Filename

Enter the name of a text file containing the barcodes you want to assign to the labware or click Browse and choose an existing file. See A.2.1.1 “Barcode files read by the Carousel commands”, A-12 for information on the required structure of the barcode file.

16.5 Commands for the Hettich Centrifuge

The Hettich Centrifuge is a centrifuging device from the Hettich company which is fitted below the worktable and secured to the floor. It can be loaded and unloaded by reaching through a hole in the worktable with a robot. It can perform centrifuging of samples at configurable speeds and temperatures.

16.5.1 Hettich Centrifuge - Init Command

The Init command initializes the centrifuge. You must initialize the hardware with this command before you use the other commands for this device.
This command has no execution parameters or objects, pre-actions or post-actions.

16.5.2 Hettich Centrifuge - Open Command

The Open command opens the door of the centrifuge.
This command has no execution parameters or objects, pre-actions or post-actions.

16.5.3 Hettich Centrifuge - Close Command

The Close command closes the door of the centrifuge.
This command has no execution parameters or objects, pre-actions or post-actions.

16.5.4 Hettich Centrifuge - ExecuteN Command

The ExecuteN command carries out centrifuging with N rotor positions of the device occupied by labware (N = 1, 2, 3 or 4). After the microplates have been placed into the device and the door closed, the centrifuge will start rotating with the specified parameters.
To avoid mechanical imbalance, microplates must be put into the centrifuge in pairs. For example, if you only want to centrifuge one microplate (Execute1 command), you must put a second microplate in the opposite rotor position of the centrifuge. You can do this by specifying appropriate RoMa MoveObject commands in the custom pre-actions and post-actions. However, if you always want to centrifuge just one microplate, it is easier and more efficient to put a second microplate into the centrifuge by hand.
The **Execute1** command puts the microplate in rotor position 1 – to avoid imbalance you must put another microplate in rotor position 3. The **Execute2** command puts microplates in rotor positions 1 and 3 (a balancing microplate is not necessary). The **Execute3** command puts microplates in rotor positions 1, 2 and 3 – to avoid imbalance you must put another microplate in rotor position 4. The **Execute4** command puts microplates in rotor positions 1, 2, 3 and 4 (a balancing microplate is not necessary).

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

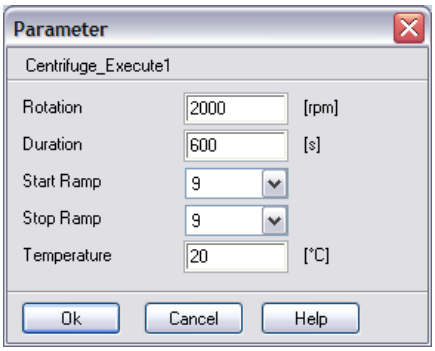

Fig. 16-14 *Hettich Centrifuge ExecuteN command*

Rotation

Specify the speed of the rotation in rounds per minute.

Duration

Specify the duration of the rotation in seconds.

Start Ramp

Choose the required ramp for accelerating the centrifuge to the working speed (range: 1 - 9).

Stop Ramp

Choose the required ramp for decelerating and stopping the centrifuge when centrifuging is finished (range: 1 - 9).

Temperature

Specify the required temperature during rotation in degrees Celsius. The rotation of the centrifuge heats up the air within due to air friction. For this reason, the centrifuge is provided with a cooling system.

The heating effect depends e.g. on the speed of rotation, the number of buckets which are loaded with labware and the duration of centrifuging. Whereas the theoretical minimum temperature is ca. 5 ºC, the achievable minimum temperature may be significantly higher than this and must be determined by measurement if it is important for your application. Please refer to the hardware manual of your Hettich centrifuge for more information.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Execute N commands operate on N objects of type *Sample* or a derived type with default names *MP, MP2, MP3* and *MP4*.

Pre-actions and Post-actions

The labware is brought to the *Centrifuge* location with a RoMa MoveObject command for each of the N microplates and brought back to its *Base* location with another RoMa MoveObject command for each microplate.

16.5.5 Hettich Centrifuge - MoveToPos Command

The MoveToPos command slowly turns the centrifuge rotor to align the specified bucket (rotor position) with the transfer position. After opening the door, the labware can then be removed or inserted using the RoMa. Please note that the centrifuge normally requires you to use a long arm RoMa. The MoveToPos command is mainly intended for Freedom EVOware Standard. It is not normally needed for Freedom EVOware Plus.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

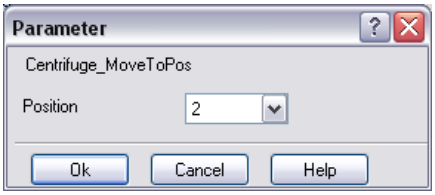

Fig. 16-15 *Hettich Centrifuge MoveToPos command*

Position

Specify the number of the bucket (rotor position) which you want to align with the transfer position.

16.6 Commands for the Columbus Washer

The Columbus Washer is used for stripwise washing of 96-well microplates (optional: 384-well microplates). It can be equipped with either a 8, 12 or 16 way manifold or a 384 way manifold, each of which are provided with one aspirating and one dispensing needle per well. It can store up to 9 user-defined labware types that define the dispensing and aspirating positions for round or flat bottomed plates. The dispensing and aspirating speeds can be selected from 5 pre-defined speed settings. For dispensing, an additional drip mode setting is available which allows a wash liquid to be added drop by drop. In the soaking phase, you can also activate a microplate shaking mechanism. These features allow the device to be used for all ELISA microplate washing applications including cell washing.

16.6.1 Columbus Washer - WashPlate command

The WashPlate command performs the washing of a microplate.
The washing parameters you specify with this command are used to create a washing program which is copied to the first program position in the Columbus washer and then executed. If the first program position in the washer already contains a user-defined washing program, it is overwritten.

Execution parameters

You are prompted to specify the execution parameters when you add this command to your script or process. The dialog box has three tabs.

16.6.1.1 General Tab of the Columbus Washer - WashPlate Command

The General tab is used to set the general washing parameters.

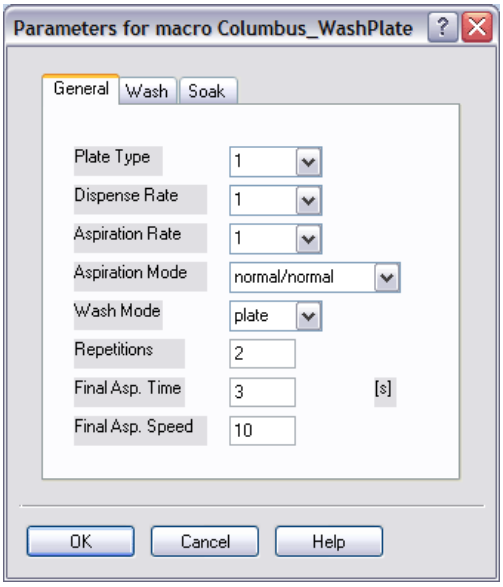

Fig. 16-16 *Columbus WashPlate command - General tab*

Plate type

The Columbus washer can store parameter sets for up to nine different labware types. The parameter sets are created using the menus on the washer's LCD panel. Choose the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

Dispense Rate, Aspiration Rate

Choose the required speed of the dispensing and aspirating pump.

Aspiration Mode

Choose the required aspiration mode. The available options are normal/normal, crosswise/crosswise, normal/crosswise and crosswise/normal. Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This minimizes the volume of residual liquids. For more information, please refer to the corresponding section in the operating manual of your washer.

Wash mode

Choose whether you want to use plate mode or strip mode. In plate mode, each process step is performed on all of the strips sequentially before proceeding to the next process step. The entire microplate is processed for the defined soaking time. In strip mode, the entire wash program is performed on a single strip (i.e. one column or row of the microplate, depending on wash orientation) before proceeding to the next strip. Each strip is processed for the defined soaking time before proceeding to the next strip. See also 17.5 "Columbus Washer - Washing a Variable Number of Strips in the Plate", 17-15.

Repetitions

Specify the required number of repetitions of the washing procedure.

Final Asp. Time

Specify the required final aspiration time (range: 1 to 20 seconds). Final aspiration is used to remove remaining liquid from the wells after the washing procedure.

Final Asp. Speed

Specify the required final aspiration speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

16.6.1.2 Wash Tab of the Columbus Washer - WashPlate Command

The Wash tab is used to set additional washing parameters.

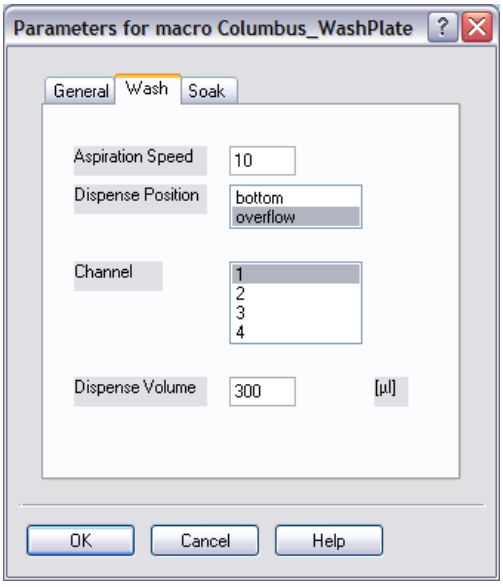

Fig. 16-17 *Columbus WashPlate command - Wash tab*

Aspiration Speed

Specify the required aspiration speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

Dispense Position

Choose the required washing mode (overflow or bottom washing). Overflow washing consists of a simultaneous aspiration and dispensing step. It creates a circular flow of the washing liquid in the well.

Channel

Choose the channel (liquid container) which contains the required washing liquid.

Dispense Volume

Specify the required dispense volume (in µl).

16.6.1.3 Soak Tab of the Columbus Washer - WashPlate Command

If you want to soak the microplate, the corresponding parameters are set in the Soak tab.

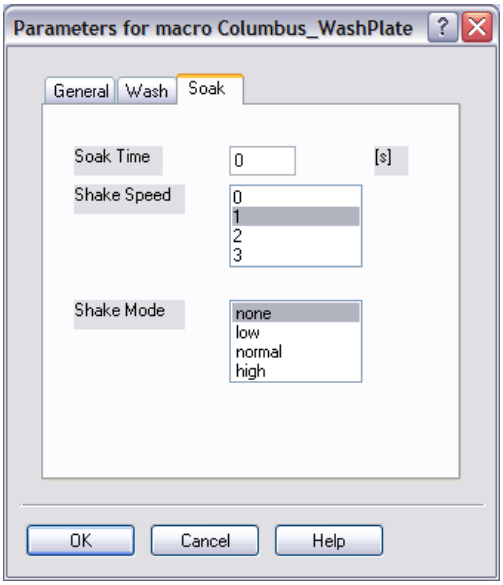

Fig. 16-18 *Columbus WashPlate command - Soak tab*

Soak Time, Shake Speed, Shake Mode

If you want to soak the microplate, set the soaking time to a value greater than 0 seconds. To shake the microplate while soaking, choose one of the shaking modes (low, normal or high) and set soak time and shake speed to values greater than 0.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The WashPlate command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Columbus* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.6.2 Columbus Washer - Prime Command

Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure.

Priming can take several minutes, so you should start priming with this command at an early stage in your script or process to make sure that the washer is ready when you want to use it.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

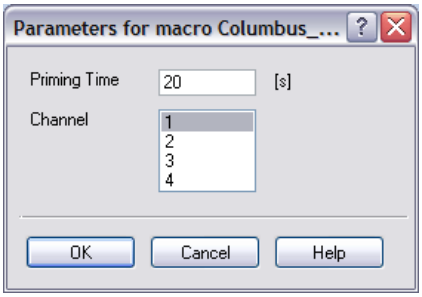

Fig. 16-19 *Columbus Washer Prime command*

Priming time

Specify the required priming time.

Channel

Choose the channel which contains the required priming liquid.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.6.3 Columbus Washer- Rinse Command

The Rinse command starts the rinsing procedure of the washer to flush the liquid system and prevent needle blockages. Rinsing should be performed when the device is left in standby or is switched off at the end of use. Four different rinse modes are available.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

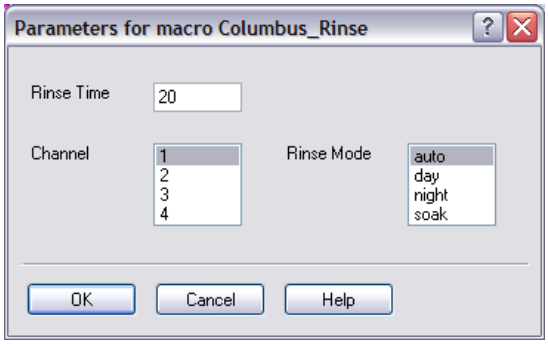

Fig. 16-20 *Columbus Washer Rinse command*

Rinse Time

Specify the required rinsing time.

Channel

Choose the channel which contains the required rinsing liquid.

Rinse Mode

Specify the mode to be used for rinsing. Four modes are available:

Soak mode should be used if the washer will be left standing for a short time only (less than one hour). You can rinse the system with either distilled water or wash solution.

Day mode should be used if the washer will be or has been left standing for a least one hour. Day mode rinsing is normally carried out with wash liquid. Use distilled water instead if the washer has been unused for longer than two hours.

Night mode should be used at the end of the day to thoroughly rinse the liquid system and leave the manifold (wash head) soaking in the waste sink. Night mode rinsing is normally carried out with distilled water.

Auto mode is the same as day mode except that rinsing is automatically repeated after a specified amount of time (1 to 24 hours). The auto-rinse repeat time is configured using the washer's LCD panel.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.6.4 Columbus Washer - Remote Command

The Remote command switches the device from local mode to remote mode. The device can only be controlled remotely by Freedom EVOware (through the interface cable) in remote mode.

This command has no execution parameters or objects, pre-actions or post-actions.

16.6.5 Columbus Washer - ExitRemote Command

The ExitRemote command switches the device from remote mode to local mode. The device can not be controlled remotely by Freedom EVOware (through the interface cable) in local mode. Using this command will disconnect the device from the Freedom EVOware software.

This command has no execution parameters or objects, pre-actions or post-actions.

16.6.6 Columbus Washer - Status Command

The Status command interrogates the status of the Columbus washer. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.6.7 Columbus Washer - Init Command

The Init command initializes the washer. You must initialize the hardware with this command before you use the other commands for this device.

This command has no execution parameters or objects, pre-actions or post-actions.

16.6.8 Columbus Washer - StopRinse Command

The StopRinse command stops the currently running rinsing procedure.
This command has no execution parameters or objects, pre-actions or post-actions.

16.6.9 Columbus Washer - StartProg Command

The StartProg command starts a washing program which is stored in the Columbus washer. The washer is capable of storing up to 30 user-definable washing programs which are identified by a number. For information on creating and storing washing programs please refer to the corresponding section in the operating manual of your washer.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

Fig. 16-21 *Columbus StartProg command*

Program Number, Number of Strips

Specify the number of the wash program you want to run.

Number of Strips

Specify the number of strips (i.e. rows or columns of the microplate) to be washed (range: 1 to 32).

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The StartProg command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Columbus* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.6.10 Columbus Washer - WashPlateEx Command

The WashPlateEx command performs the washing of a microplate. Information on the channels (liquid containers) to use with this command is read from an external text file.

The washing parameters you specify with this command are used to create a washing program which is copied to the first program position in the Columbus washer and then executed. If the first program position in the washer already contains a user-defined washing program, it is overwritten.

Execution parameters

You are prompted to specify the execution parameters when you add this command to your script or process. The dialog box has three tabs.

16.6.10.1 General Tab of the Columbus Washer - WashPlateEx Command

The General tab is used to set the general washing parameters.

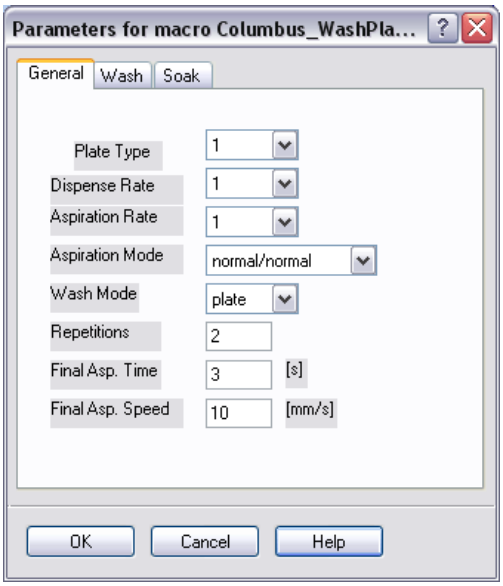

Fig. 16-22 *Columbus WashPlateEx command - General tab*

Plate type

The Columbus washer can store parameter sets for up to nine different labware types. The parameter sets are created using the menus on the washer's LCD panel. Choose the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

Dispense Rate, Aspiration Rate

Choose the required speed of the dispensing and aspirating pump.

Aspiration Mode

Choose the required aspiration mode. The available options are normal/normal, crosswise/crosswise, normal/crosswise and crosswise/normal. Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This minimizes the volume of residual liquids. For more information, please refer to the corresponding section in the operating manual of your washer.

Wash mode

Choose whether you want to use plate mode or strip mode. In plate mode, each process step is performed on all of the strips sequentially before proceeding to the next process step. The entire microplate is processed for the defined soaking time. In strip mode, the entire wash program is performed on a single strip (i.e. one column or row of the microplate, depending on wash orientation) before proceeding to the next strip. Each strip is processed for the defined soaking time before proceeding to the next strip. See also 17.5 “Columbus Washer - Washing a Variable Number of Strips in the Plate”, 17-15.

Repetitions

Specify the required number of repetitions of the washing procedure.

Final Asp. Time

Specify the required final aspiration time (range: 1 to 20 seconds). Final aspiration is used to remove remaining liquid from the wells after the washing procedure.

Final Asp. Speed

Specify the required final aspiration speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

16.6.10.2 Wash Tab of the Columbus Washer - WashPlateEx Command

The Wash tab is used to set additional washing parameters.

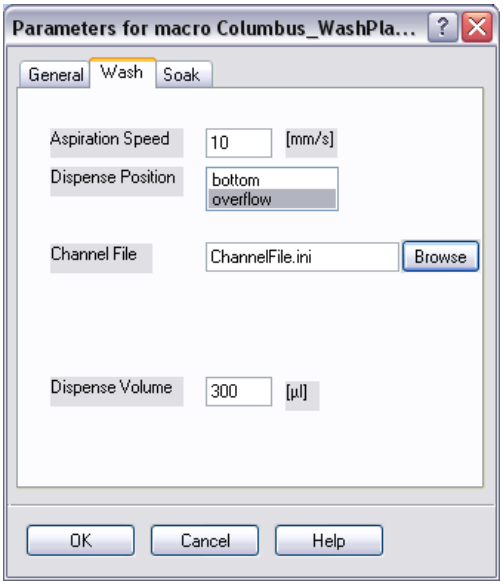

Fig. 16-23 *Columbus WashPlateEx command - Wash tab*

Aspiration Speed

Specify the required aspiration speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

Dispense Position

Choose the required washing mode (overflow or bottom washing). Overflow washing consists of a simultaneous aspiration and dispensing step. It creates a circular flow of the washing liquid in the well.

Channel File

Specify the required channel file. Enter the file name directly or click Browse and choose an existing file. The channel file specifies the channel (liquid container) which contains the required washing liquid. The syntax of the file is as follows:

[Wash]

Channel=<channel_number>

For example:

[Wash]

Channel=1

The folder (directory) which contains the channel files is configured in the Columbus driver settings (see 8.5.6.2 “Columbus Washer Configuration - Settings Tab”, 8-51).

Dispense Volume

Specify the required dispense volume (in µl).

16.6.10.3 Soak Tab of the Columbus Washer - WashPlateEx Command

If you want to soak the microplate, the corresponding parameters are set in the Soak tab.

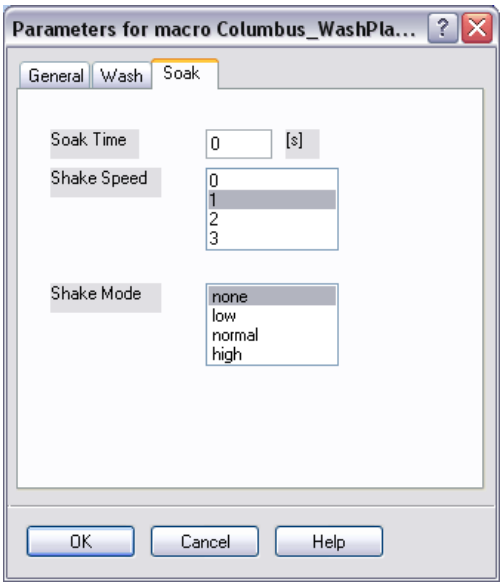

Fig. 16-24 *Columbus WashPlateEx command - Soak tab*

Soak Time, Shake Speed, Shake Mode

If you want to soak the microplate, set the soaking time to a value greater than 0 seconds. To shake the microplate while soaking, choose one of the shaking modes (low, normal or high) and set soak time and shake speed to values greater than 0.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The WashPlate command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Columbus* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.6.11 Columbus Washer - DisableAutoPrime Command

The DisableAutoPrime command disables the auto-priming function for the Columbus washer. Auto-priming is configured in the Columbus driver settings (see 8.5.6.3 “Columbus Washer Configuration - Autopriming Tab”, 8-52).

This command has no execution parameters or objects, pre-actions or post-actions.

16.6.12 Columbus Washer - AllowAutoPrime Command

The AllowAutoPrime command activates the auto-priming function for the Columbus washer. Auto-priming is configured in the Columbus driver settings (see 8.5.6.3 “Columbus Washer Configuration - Autopriming Tab”, 8-52).

This command has no execution parameters or objects, pre-actions or post-actions.

16.7 Commands for the FlaskFlipper

The FlaskFlipper hardware option is one of the components of the Tecan Cellerity system. Cellerity is a modular system based on the Freedom EVO series of pipetting instruments which allows you to automate typical cell biology processes for adherent cell lines such as cell feeding, harvesting and passaging. It uses microplate-sized automation-friendly cell culturing flasks such as the Corning Roboflask®.

The FlaskFlipper is mounted on the worktable of the pipetting instrument and is used to load, unload, hold, shake and knock the cell culture flasks.

16.7.1 FlaskFlipper - ExecuteScript Command

The ExecuteScript command is used to execute commands for the FlaskFlipper. Most of the functions can also be executed using the other FlaskFlipper commands.

Choose the required operation from the pull-down list:

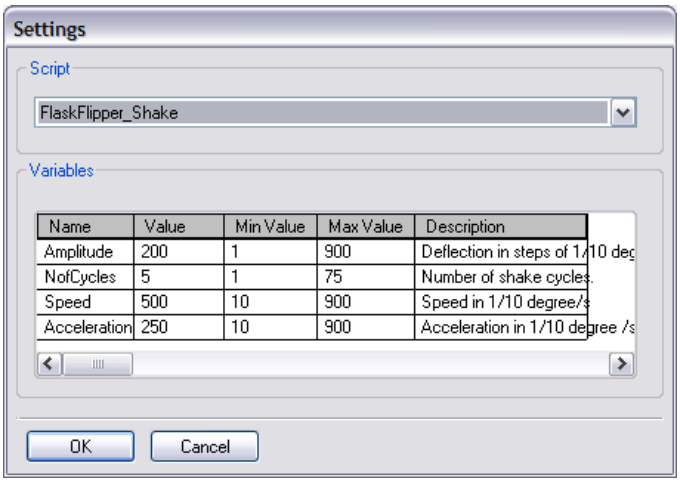

Fig. 16-25 *FlaskFlipper ExecuteScript command*

Script panel

The available commands are:

- Initialize: This command initializes the FlaskFlipper; it is is intended for special applications. Freedom EVOware normally initializes the FlaskFlipper automatically at the appropriate time.
- Shutdown: This command shuts down the FlaskFlipper; it is is intended for special applications. Freedom EVOware normally shuts down the FlaskFlipper automatically at the appropriate time.
- FlaskFlipper_LoadUnloadFlask: For more information see 16.7.2 “FlaskFlipper - LoadUnloadFlask Command”, 🗎 16-30.
- FlaskFlipper_PrepareForPipet. For more information see 16.7.3 “FlaskFlipper - PrepareForPipette Command”, 🗎 16-31
- FlaskFlipper_Shake. For information on the execution parameters see 16.7.4 “FlaskFlipper - Shake Command”, 🗎 16-31.
- FlaskFlipper_Knock. For information on the execution parameters see 16.7.5 “FlaskFlipper - Knock Command”, 🗎 16-32.

This command has no objects, pre-actions or post-actions.

16.7.2 FlaskFlipper - LoadUnloadFlask Command

The LoadUnloadFlask command turns the flask flipper to the horizontal position and opens the flask holding mechanism. In this position, you can load (insert) or unload (remove) flasks using the plate robot (RoMa) or the Cellerity AutoLoader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.7.3 FlaskFlipper - PrepareForPipette Command

The PrepareForPipette command closes the flask holding mechanism and turns the flask flipper to the vertical position. In this position, you can pipette into the flasks through the septum in the screw cap using the liquid handling arm (LiHa).

This command has no execution parameters or objects, pre-actions or post-actions.

16.7.4 FlaskFlipper - Shake Command

The Shake command is used to shake the flasks in the flask flipper for the purpose of distributing and mixing liquids. This is done by alternately rocking the flask flipper clockwise and counterclockwise with the specified shaking amplitude and acceleration. The shaking starts and ends in the horizontal position.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

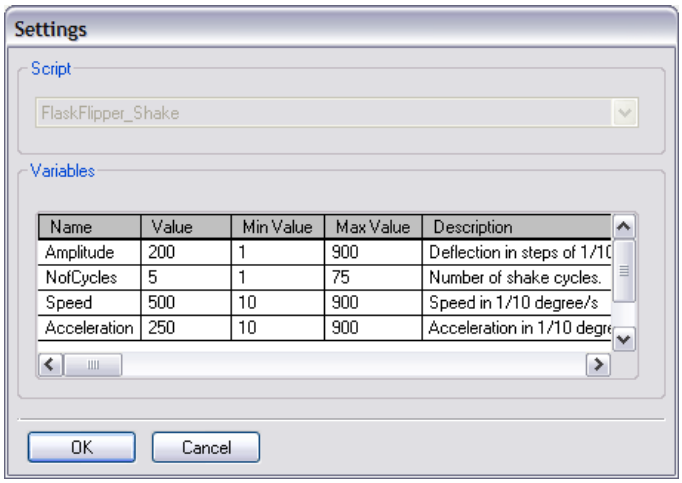

Fig. 16-26 *FlaskFlipper Shake command*

Variables panel

Name

Parameter name. This field cannot be edited.

Value

Amplitude: required amplitude of the shaking in 0.1° (default: 200)
NofCycles: required number of shaking cycles (default: 5)
Speed: required speed of shaking in 0.1°/s (default: 500)
Acceleration: required acceleration at the endpoints of shaking in 0.1°/s^2 (default: 250)

Min. and Max. Value

Minimum and maximum value (i.e.range). This field cannot be edited.

Description

Parameter description. These fields cannot be edited.

This command has no objects, pre-actions or post-actions.

16.7.5 FlaskFlipper - Knock Command

The Knock command moves the flask flipper to the horizontal position and knocks the flasks using a spring-loaded mechanism. This is done to detach the cell culture from the inner wall of a flask when the culture is fully grown. The force of the impact is sufficient to detach the cell culture from the growth surface.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

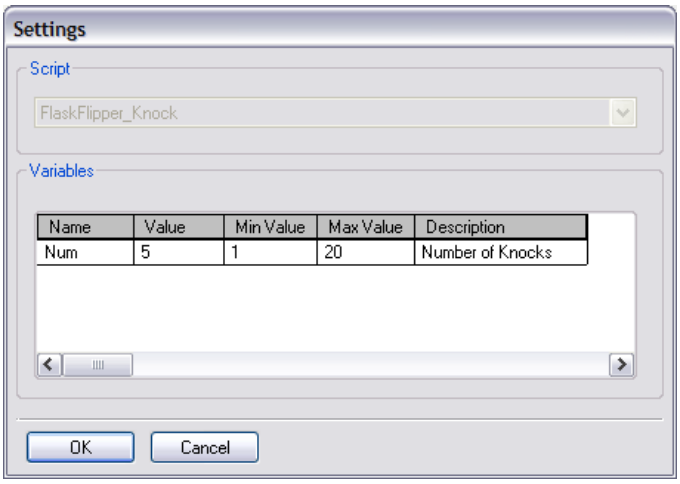

Fig. 16-27 *FlaskFlipper Knock command*

Variables panel

Name
Parameter name. This field cannot be edited.

Value
Num: Required number of knocks (range: 1 to 20, default: 5).

Min. and Max. Value
Minimum and maximum value (i.e.range). These fields cannot be edited.

Description
Parameter description. This field cannot be edited.

This command has no objects, pre-actions or post-actions.

16.8 Commands for the GENios Reader

The Tecan GENios is a fully automatic computer-controlled microplate reader for measuring samples in microplates. It fulfills the requirements for numerous fluorescence, absorbance and glow type luminescence applications in research and routine investigations. It can be used with 384, 96, 24, 12 or 6 well microplates. The filters are arranged in filter slides which allow up to four excitation filters and four emission filters.

The commands for this reader require the RdrOLE and XFluor4 software, which must be installed separately. Freedom EVOware can also control this reader using the Magellan software (see 16.16 “Commands for the Magellan option”, 16-48).

16.8.1 GENios Reader - Status Command

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.8.2 GENios Reader - Excitation Out Command

On some readers, the excitation light source can be filtered with an interference filter. The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.8.3 GENios Reader - Emission Out Command

On some readers, the light emission detector of the reader can be filtered with an interference filter. The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.8.4 GENios Reader - Open Command

The Open command opens the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.8.5 GENios Reader - Close Command

The Close command closes the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.8.6 GENios Reader - Measure Command

The Measure command performs a measurement procedure using external software. For a detailed description of the parameters of this command please consult the documentation for RdrOLE and XFluor4.

Execution parameters

The RdrOLE reader interface software prompts you to specify the measurement parameters when you add this command to your script or process. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

After making your entries in the Measurement Parameters dialog box and clicking **Ok**, the Output dialog box is shown where you must specify the name of the output file for the measurements. Alternatively, click Browse and choose an existing file. A default file name will be suggested automatically:

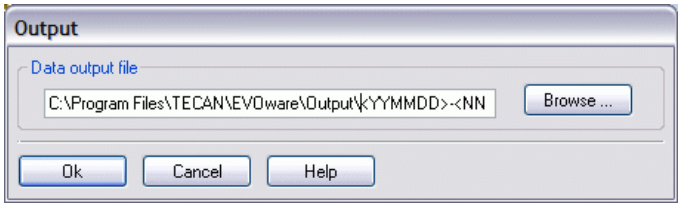

Fig. 16-28 *Specifying the output file of the GENios Reader Measure command*

See 16.42 "Specifying Output Filenames for Reader Data", 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Measure command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and post-actions

The labware is brought to the *GENios* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.8.7 GENios Reader - Multilabel Command

The Multilabel command performs up to four consecutive measurement steps on the same labware using external software. The labware does not have to leave the reader in between measurements. Multi labeling allows different components (labelled with different fluorophores) to be detected in one operation.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

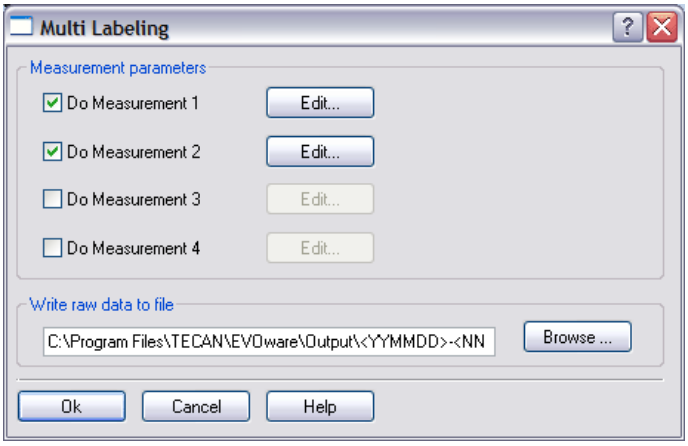

Fig. 16-29 *GENios Reader Multilabel command*

Measurement parameters

For each measurement step you want to perform, check the corresponding checkbox and click **Edit**. The RdrOLE reader interface software then prompts you to specify the measurement parameters. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

Write raw data to file

Enter the path and name of the raw data file or click Browse and choose an existing file. A default file name will be suggested automatically. See 16.42 "Specifying Output Filenames for Reader Data", 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Multilabel command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *GENios* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.9 Commands for the GENios Pro Reader

The Tecan GENios Pro is a multifunctional microplate reader with injector option. The GENios Pro provides high performance for the vast majority of today's microplate applications and research and is robotic compatible. It supports several measurement techniques such as Fluorescence Intensity (FI), Fluorescence Time Resolved (FTR), Fluorescence Polarization (FP), Flash Fluorescence, Absorbance, Absorbance with Injectors, Glow Type Chemi- or Bioluminescence, Bioluminescence Resonance Energy Transger (BRET) and Flash Luminescence.

Any common microplate ranging from 6 to 384 well format maybe measured with any of the above measurement techniques. Switching between measurement techniques or labware formats is fully automated via software. It is designed for optimum sensitivity and speed of measurement.

The commands for this reader require the RdrOLE and XFluor4 software, which must be installed separately. Freedom EVOware can also control this reader using the Magellan software (see 16.16 "Commands for the Magellan option", 16-48).

16.9.1 GENios Pro Reader - Status Command

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 "Runtime Controller, Extended View (Running a Process)", 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.9.2 GENios Pro Reader - Excitation Out Command

On some readers, the excitation light source can be filtered with an interference filter. The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.9.3 GENios Pro Reader - Emission Out Command

On some readers, the light emission detector of the reader can be filtered with an interference filter. The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.9.4 GENios Pro Reader - Open Command

The Open command opens the door of the reader.
This command has no execution parameters or objects, pre-actions or post-actions.

16.9.5 GENios Pro Reader - Close Command

The Close command closes the door of the reader.
This command has no execution parameters or objects, pre-actions or post-actions.

16.9.6 GENios Pro Reader - Measure Command

The Measure command performs a measurement procedure using external software. For a detailed description of the parameters of this command please consult the documentation for RdrOLE and XFluor4.

Execution parameters

The RdrOLE reader interface software prompts you to specify the measurement parameters when you add this command to your script or process. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

After making your entries in the Measurement Parameters dialog box and clicking **Ok**, the Output dialog box is shown where you must specify the name of the output file for the measurements. Alternatively, click Browse and choose an existing file. A default file name will be suggested automatically:

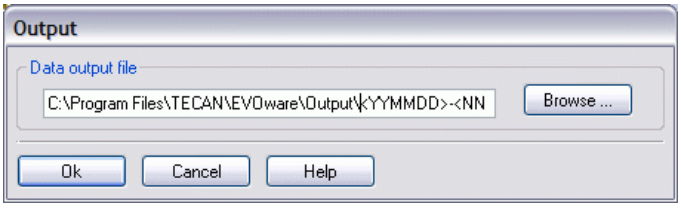

Fig. 16-30 *Specifying the output file of the GENios Pro Reader Measure command*

See 16.42 "Specifying Output Filenames for Reader Data", 16-128 for a description of the placeholders which can be used to generate reader data file names.
To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Measure command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and post-actions

The labware is brought to the *GENios Pro* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.9.7 GENios Pro Reader - Multilabel Command

The Multilabel command performs up to four consecutive measurement steps on the same labware using external software. The labware does not have to leave the reader in between measurements. Multi labeling allows different components (labelled with different fluorophores) to be detected in one operation.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

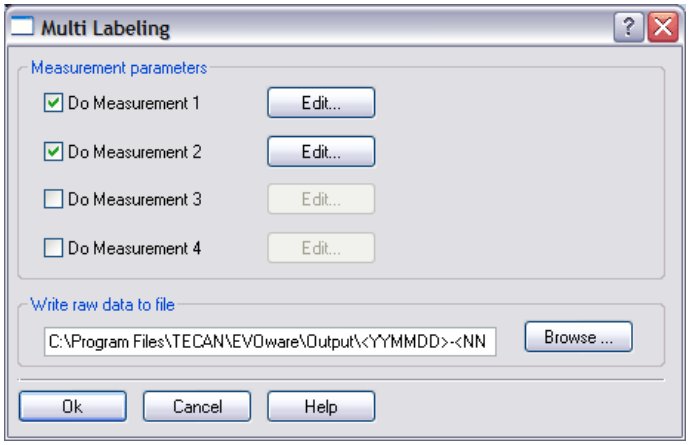

Fig. 16-31 *GENios Pro Reader Multilabel command*

Measurement parameters

For each measurement step you want to perform, check the corresponding checkbox and click **Edit**. The RdrOLE reader interface software then prompts you to specify the measurement parameters. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

Write raw data to file

Enter the path and name of the raw data file or click Browse and choose an existing file. A default file name will be suggested automatically. See 16.42 "Specifying Output Filenames for Reader Data", 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Multilabel command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *GENios Pro* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.9.8 GENios Pro Reader - PrimeManual Command

if the reader is equipped with the injector option, the PrimeManual command is used to prime the reader injectors manually. The injectors must be primed before they are first used in a process or script. For this procedure the injector carrier is removed from the carrier slot and rotated 180 degrees so that the injector needles face away from the instrument and then partially reinserted into the slot for support. Please refer to the manual of your GENios Pro reader for details on how to properly perform the priming procedure. The priming process can take several minutes so you should start priming with this command at an early stage in your script or process to make sure that the reader is ready when you want to use it.

This command has no execution parameters or objects, pre-actions or post-actions.

16.9.9 GENios Pro Reader - DispenseManual Command

if the reader is equipped with the injector option, the DispenseManual command is used to dispense fluid from the injectors manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.10 Commands for the Heated Incubator

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place. The heated incubator can be fitted with a shaker option.

Freedom EVOware distinguishes between physical and logical incubators. A physical incubator is the device you place on the worktable of your instrument. A logical incubator is a group of incubator slots which are configured for the same incubating temperature. The group of slots can all lie within one physical incubator or can extend over more than one physical incubator. In the latter case, all of the physical incubators must have the same number of slots (4 or 6). Freedom EVOware installs three logical incubators (Heated Incubator 1 to 3). The temperature of the slots in the logical incubator is set in the Configuration Tool (see 8.5.8.2 “Heated Incubator Configuration - Settings Tab”, 8-56).

16.10.1 Heated Incubator - Incubate Command

The Incubate command incubates the labware inside the incubator for the specified amount of time. The temperature of the incubator slots is set in the Configuration Tool (8.5.8.2 “Heated Incubator Configuration - Settings Tab”, 8-56). All of the slots of the logical incubator are set to the same temperature. Freedom EVOware Plus automatically chooses the next free slot to use for incubating.

To ensure that the incubator reaches and maintains a stable temperature, make sure that the incubator doors are not left open for extended periods.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

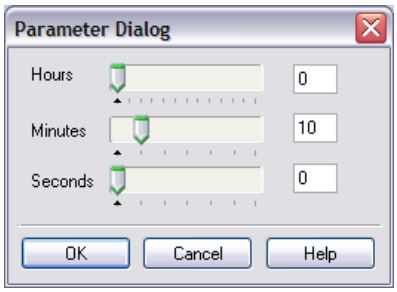

Fig. 16-32 *Heated Incubator Incubate command*

Hours, Minutes, Seconds

Specify the amount of time the labware should be kept at the chosen temperature. Click on the sliders to move them or enter the required time in the numeric fields.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Incubate command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Incubator* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.10.2 Heated Incubator - CloseDoor Command

The slot doors of the incubator open automatically when the RoMa inserts or removes the labware. The doors then stay in the open position. This command releases the latches to close all of the doors. To maintain a constant temperature within the incubator, it is best to close the doors again directly after inserting or removing labware.

This command has no execution parameters or objects, pre-actions or post-actions.

16.10.3 Heated Incubator - StartShaker Command

The StartShaker command starts the optional shaker of the incubator.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

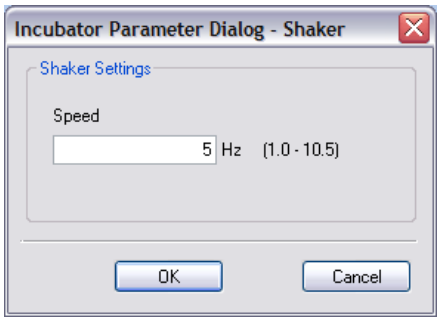

Fig. 16-33 *Heated Incubator StartShaker command*

Speed

Specify the shaking speed (range: 1 to 10.5 Hz).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.10.4 Heated Incubator - StopShaker Command

The StopShaker command stops the optional shaker of the incubator.

This command has no execution parameters or objects, pre-actions or post-actions.

16.10.5 Heated Incubator - InsertPlate Command

The InsertPlate command must be used each time the RoMa inserts labware into the incubator slot. The InsertPlate command itself does not move the labware. It's purpose is to regulate the power of the slot's heater. In addition, it tells Freedom EVOware to start recording information on the slot temperature to the log file.

Your script must also include a plate robot command to move the labware into the incubator slot; the plate robot command should precede the InsertPlate command. Typical sequence of commands: plate robot command, CloseDoor command, Insert Plate command (the slot door opens automatically when the RoMa inserts the labware).

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

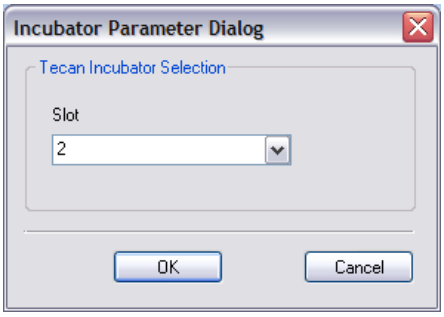

Fig. 16-34 *Heated Incubator InsertPlate command*

Slot

Choose the incubator slot into which the labware will be inserted. Incubator slots are counted from top to bottom.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.10.6 Heated Incubator - RemovePlate Command

The RemovePlate command must be used each time the RoMa removes labware from the incubator slot. The RemovePlate command itself does not move the labware. It's purpose is to tell Freedom EVOware to stop recording information on the slot temperature to the log file.

Your script must also include a plate robot command to move the labware out of the incubator slot; the plate robot command should follow the RemovePlate command. Typical sequence of commands: RemovePlate command, plate robot command, CloseDoor command (the slot door opens automatically when the RoMa removes the labware).

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

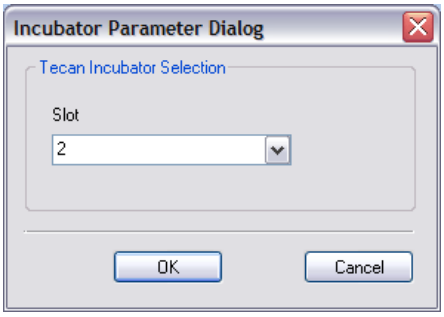

Fig. 16-35 *Heated Incubator RemovePlate command*

Slot

Choose the incubator slot from which the labware will be removed. Incubator slots are counted from top to bottom.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.10.7 Heated Incubator - SetTemperature Command

The SetTemperature command sets the specified slot of the incubator to the chosen temperature.

Changes in temperature are not instantaneous. Make sure you specify the SetTemperature command early enough in your script to ensure that the slot has sufficient time to heat up or cool down before you want to incubate.

To ensure that the slot reaches and maintains a stable temperature, make sure that the slot door is not left open (see CloseDoor command).

Note: *The default slot temperature is set in the Configuration Tool (see* *8.5.8.2 "Heated Incubator Configuration - Settings Tab", 8-56**). Unless you use the SetTemperature command, all slots of the logical incubator are set to the same temperature.*

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

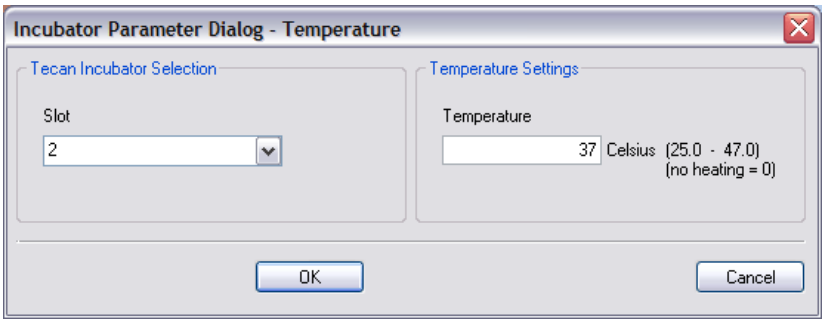

Fig. 16-36 *Heated Incubator SetTemperature command*

Tecan Incubator Selection panel

Slot

Choose the incubator slot whose temperature you want to set. You can also choose all slots. Incubator slots are counted from top to bottom.

Temperature Settings panel

Temperature

Specify the working temperature of the specified slot (range: 25 to 47°C).

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.11 Commands for the Base Incubator

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place.

The Base Incubator treats the base (labware source) location of a piece of labware as a room temperature incubator. The labware is taken back to its base position and left there for a specified length of time. In Freedom EVOware, the base incubator is a software concept. It is not a device which you can fit to your pipetting instrument.

16.11.1 Base Incubator - BaseIncubate Command

The BaseIncubate command moves the labware back to its base (labware source) position (e.g. the carousel) and leaves it there at room temperature for the specified amount of time.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

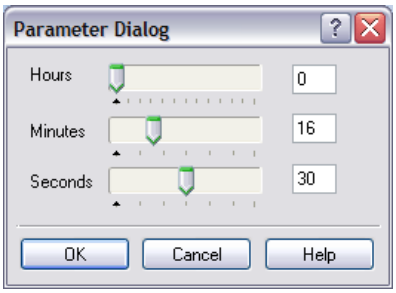

Fig. 16-37 *Base Incubator BaseIncubate command*

Specify the amount of time the labware should be kept at room temperature at its base position.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The BaseIncubate command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to its *Base* location with a RoMa MoveObject command if necessary.

16.12 Commands for the Room Temperature Incubator

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place.
The Room Temperature Incubator is a storage location such as a hotel where labware can be kept at room temperature for a specified length of time.

Note: *The same driver is used for the Base Incubator (see 16.11 "Commands for the Base Incubator", 16-44).*

16.12.1 Room Temperature Incubator - Incubate Command

The Incubate command keeps the labware at room temperature for the specified amount of time.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

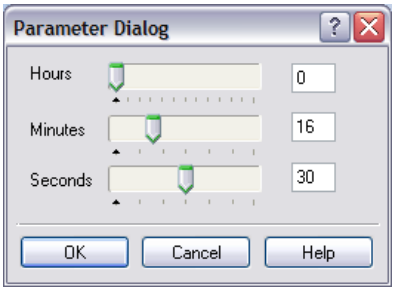

Fig. 16-38 *Room Temperature Incubator Incubate command*

Specify the amount of time the labware should be kept at room temperature.
To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Incubate command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *IncubatorRT* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.13 Commands for the Liquid Handling Arm

The Liquid Handling Arm (also called the LiHa) is a robot arm on the pipetting instrument which is mounted on the X-slide and typically holds four or eight pipetting tips. It is used for pipetting samples in different volume ranges, depending on the tip types used and the features of the liquid system.

16.13.1 Liquid Handling Arm - Flush RSP Command

The Flush RSP command uses a wash station to flush the dilutors and the tubing of the pipetting instrument (fill them with system liquid) and to flush and wash the tips on the LiHa. It is mainly intended as a service function (see 5.4.1.12 “Context Menu for Objects in the Control Bar”, 5-14). It does not flush the Te-MO. See 15.56.13 “Fill system (Te-MO 384) Command”, 15-138 if your instrument is fitted with a Te-MO.

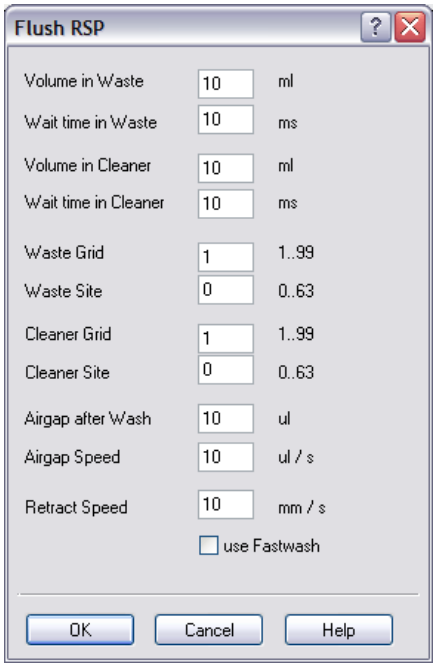

Fig. 16-39 *Flush RSP command*

Flushing is carried out to clean the system and remove trapped air. Flushing should be carried out daily before using the LiHa for the first time or if several hours have elapsed since the LiHa was last used. The parameters of this dialog box are as follows:

Volume in Waste

Specify the volume of system liquid which should be used to flush the inside of the tips (range: 0.01 - 100 ml). Flushing takes place with the tips positioned above the waste of the specified wash station (tip height = Z-dispense).

Wait time in Waste

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after flushing before moving the LiHa away from the waste (range: 0 - 1000 ms).

Volume in Cleaner

Specify the volume of system liquid which should be used to wash the outside of the tips (range: 0.01 - 100 ml). Washing takes place with the tips lowered into the cleaner of the specified wash station (tip height = Z-max).

Wait time in Cleaner

To reduce the pressure inside the tubing, you can instruct the instrument to keep the valves open somewhat longer after cleaning before moving the LiHa away from the cleaner (range: 0 - 1000 ms).

Waste Grid, Waste Site

Specify the worktable position for the waste you want to use (grid and site). You must put a wash station with waste unit in the Worktable Editor at the required position.

Cleaner Grid, Cleaner Site

Specify the worktable position for the cleaner you want to use (grid and site). You must put a wash station with waste unit in the Worktable Editor at the required position.

Choose a shallow cleaner if you only need to clean the ends of the tips. Choose a deep cleaner if there is a possibility of contamination along the shaft of the tip. The deep cleaner requires a larger volume of system liquid and cleaning takes somewhat longer.

Airgap after Washing

To avoid droplets of liquid on the worktable, you can instruct the instrument to aspirate an airgap after washing the tips. Specify the required airgap or specify 0 to deactivate this feature.

Airgap Speed

Specify the required speed for aspirating the airgap after washing the tips.

Retract Speed

Specify the speed with which you want to retract the tips from the cleaner. If the speed is too high, droplets may be dragged out of the cleaner and stick to the outside of the tips.

Use Fast Wash

If your instrument is fitted with the FWO (Fast Wash Option) or the MPO (Monitored Pump Option), check this checkbox to use the Fast Wash module instead of the dilutors to wash the tips.

16.13.2 Liquid Handling Arm - Pipette Command

The Pipette command is used to create a pipetting script for the LiHa. When you drag it to the Process Editor, it opens the Script Editor. See 11.4.2 “Creating a Pipetting Script”, 11-5.

If you want to use this command, make sure that you have set the I/O Status for the Liquid Handling Arm to ON in the Configuration Tool.

16.14 Commands for the MCA96

The MCA96 (Multi-Channel Arm 96) is a special liquid handling arm which is fitted with a 96-tip pipetting head. The pipetting head can be fitted with a tipblock (a

replaceable block with 96 tips) or with DITIs. The spacing between the tips is fixed (9 mm).

16.14.1 MCA96 - Pipette Command

The Pipette command is used to create a pipetting script for the MCA96. When you drag it to the Process Editor, it opens the Script Editor. See 11.4.2 “Creating a Pipetting Script”, 11-5.

If you want to use this command, make sure that you have set the I/O Status for the MCA96 to ON in the Configuration Tool.

16.15 Commands for the MCA384

The multi-channel arm is a special liquid handling arm which is fitted with a 96-tip pipetting head. The pipetting head can be fitted with a tipblock (a replaceable block with 96 tips) or with DITIs. The spacing between the tips is fixed (9 mm).

16.15.1 MCA384 - Pipette Command

The Pipette command is used to create a pipetting script for the MCA384. When you drag it to the Process Editor, it opens the Script Editor. See 11.4.2 “Creating a Pipetting Script”, 11-5.

If you want to use this command, make sure that you have set the I/O Status for the MCA384 to ON in the Configuration Tool.

16.16 Commands for the Magellan option

The Magellan commands are used to initiate actions to be performed by the Tecan Magellan software, which must be installed separately. The Magellan software is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. Please refer to the documentation of the Magellan software for more information.

The Magellan software has built-in drivers for Tecan microplate readers. If you intend to use the Magellan software, it is not necessary to install the driver for your reader when you install Freedom EVOware.

If you use the Magellan commands to control your reader, the Magellan software pre-processes and analyzes the reader data according to a specified, stored procedure (“Magellan method”). If you use the Freedom EVOware commands for your reader directly without using the Magellan software, the reader data in the output file will be unprocessed (raw data).

16.16.1 Magellan - Status Command

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime

controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).
This command has no execution parameters or objects, pre-actions or post-actions.

16.16.2 Magellan - Excitation Out Command

On some readers, the excitation light source can be filtered with an interference filter. The Excitation Out command is used to move the excitation filter slide out of the reader to allow the filters to be removed or exchanged.
After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.
This command has no execution parameters or objects, pre or post actions

16.16.3 Magellan - Emission Out Command

On some readers, the light emission detector of the reader can be filtered with an interference filter. The Emission Out command is used to move the emission filter slide out of the reader to allow the filters to be removed or exchanged.
After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.
This command has no execution parameters or objects, pre-actions or post-actions.

16.16.4 Magellan - Open Command

The Open command opens the door of the respective reader.
This command has no execution parameters or objects, pre-actions or post-actions.

16.16.5 Magellan - Close Command

The Close command closes the door of the respective reader.
This command has no execution parameters or objects, pre-actions or post-actions.

16.16.6 Magellan - Measure Command

The Measure command initiates a measurement procedure to be performed by the Magellan software, which must be installed separately. The Magellan software is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. The procedures to be used are specified in the Magellan software as so-called “methods”. Please refer to the documentation of the Magellan software for more information.
See 17.9 “Using Freedom EVOware with the Tecan Magellan Software”, 17-29 for more information on using the Magellan Measure command.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

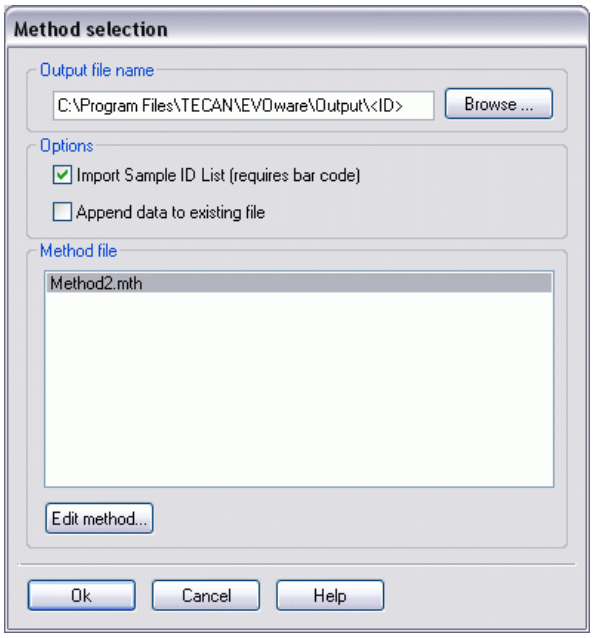

Fig. 16-40 *Magellan Measure command*

Output file name

Specify the required filename and path of the output file (workspace file). The default filename and path which is shown is the one you specified in Freedom EVOware's Configuration Tool (see 17.9.3.1 "Magellan Output File (Workspace File)", 17-30).

If you are using a barcode scanner, you should specify the filename as the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. The labware must be scanned in advance of the Magellan Measure command.

Note: *In both Magellan Standard and Magellan Tracker, if you leave the Output File Name field blank in Freedom EVOware, the filename and path of the workspace file will be taken from the settings which were made in the Magellan method.*

Import Sample ID list

Check the Import sample ID list checkbox if you have scanned the tube barcodes in advance of the Magellan Measure command. This instructs the Magellan software to extract the tube barcodes from a labware report file and assign them to the samples. The barcode information will then be contained in

the Magellan output file (workspace file) which is produced. The workspace file will also contain information from Freedom EVOware on pipetting errors (if any). The barcodes and pipetting errors can then be viewed by loading the generated workspace file in Magellan.

To create a labware report file, you must use the script command Export Data before using the Measure command for the Magellan software. See 17.9 “Using Freedom EVOware with the Tecan Magellan Software”, 17-29 for more information.

Freedom EVOware Standard: The labware must be brought to the reader using the Transfer Labware command and not using another RoMa command. Otherwise, the barcodes and the pipetting information will not be transferred with the labware.

Freedom EVOware Plus: The PosID and Export Data commands must be in the same pipetting script since the tube barcodes are not normally available globally (see the description of Scope in the Freedom EVOware software manual).

Append data to existing file

Check this checkbox if you want to append the measurement data to an existing output file (workspace file). This option is mainly intended for kinetic measurements (frequent or repeated measurement of the reaction to determine the rate or progress). This option must be activated in all Magellan Measure commands in the kinetic series except for the first one. This option requires labware with barcodes (you must also check the checkbox *Import sample ID list*).

Edit method

Click this button to edit the selected method using the Edit Method wizard of the Magellan software.

Method file panel

The Method File panel only shows methods which are compatible with the currently configured reader type and Magellan version (Standard or Tracker). See 17.9.3.3 “Specifying the Reader Type in Freedom EVOware”, 17-31.

You can only edit the method if you have Application Specialist rights in Magellan.

Objects

The Measure command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Magellan* location with a RoMa MoveObject command and the door of the reader is opened with the reader’s Open command. After the measurement the labware is brought back to its *Base* location with another RoMa MoveObject command the door is closed with the reader’s Close command.

16.17 Commands for the PW384 Washer

The PW384 is a microplate washer which performs ultra-fast washing of both 384-well and 96-well microplates. The PW384 not only processes all 384 wells

simultaneously, but uses “Overflow” washing to further boost wash performance. This wash procedure combines high wash efficiency with short wash times, since no transport steps are required to index the wash head.

The Freedom EVOware driver is based on Tecan’s WinWash Plus Software. WinWash Plus is an MS Windows-based program which is supplied with Tecan Plate Washers. It lets you create wash programs and download and upload them to/from the plate washer via the RS232 interface. It also functions as the software interface between Freedom EVOware and the plate washer hardware. Since the WinWash Plus Software uses an OLE Interface, the implementation is transparent to the user.

See 18.1.27 “Liquid Error (PW384)”, 18-27 for information on liquid error handling when the script or process is run.

Note: *The WinWash Plus Software must be installed if you want to use the PW 384 Plate Washer with the PW384 driver. See also 16.18 “Commands for the PW384GP Washer”, 16-54.*

16.17.1 PW384 Washer - Status Command

The Status command interrogates the status of the washer. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.17.2 PW384 Washer - Prime Command

Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure.

Priming can take several minutes so you should start priming with this command at an early stage in your script or process to make sure that the washer is ready when you want to use it.

This command has no execution parameters or objects, pre-actions or post-actions.

16.17.3 PW384 Washer - Rinse Command

The Rinse command starts the rinsing procedure of the washer to flush the liquid system.

This command has no execution parameters or objects, pre-actions or post-actions.

16.17.4 PW384 Washer - Wash Command

The Wash command performs the washing of a microplate by executing a wash program which is stored in the washer. For information on creating and storing washing programs please refer to the operating manual of the WinWash Plus software.

Execution parameters

The WinWash Plus software prompts you to specify the following execution parameters when you add this command to your script or process:

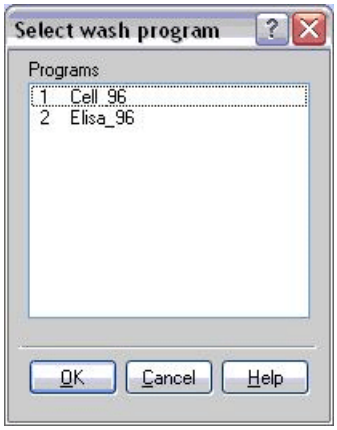

Fig. 16-41 *PW384 - Wash command*

Programs

Choose the Wash program that you want to run. The WinWash Plus software gets this list by interrogating the washer. WinWash Plus can also be used to create the wash programs.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Wash command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *PW384* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.17.5 PW384 Washer - Stop Command

The Stop command stops the washing procedure.

This command has no execution parameters or objects, pre-actions or post-actions.

16.17.6 PW384 Washer - PrepareEmptyWaste Command

The PrepareEmptyWaste command collapses the vacuum in the waste bottle to allow it to be emptied. This needs to be done whenever the washer's liquid detection indicates that the waste bottle is full.

This command has no execution parameters or objects, pre-actions or post-actions.

16.18 Commands for the PW384GP Washer

The Tecan PW384 Washer is a fully automated microplate washer for all types of 96-well microplates. The device is fitted with a 96-well wash head, which has one aspirating and one dispensing needle per well. The plate carrier is adjustable to enable the use types of round and flat bottom microplates. The device is also equipped with a mirror so that visual quality control can be performed during the washing procedure. By treating all 96 wells of the microplate simultaneously, the washer is able to achieve very short wash times.

The PW384GP driver communicates with the PW 384 washer using native firmware commands. When compared to the PW384 driver, which communicates with the PW 384 through the Tecan WinWash Plus software, this leads to more effficient control of the hardware. WinWash Plus is not necessary for the PW384GP driver. The PW384GP driver can be used for both research applications and general purpose applications.

See 18.1.28 “Liquid Error (PW384GP)”, 18-28 for information on liquid error handling when the script or process is run.

16.18.1 PW384GP Washer - Aspirate Command

The Aspirate command starts the aspiration procedure of the washer. This command is mainly intended for special applications, e.g. to remove sample or reagent liquids from the wells.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

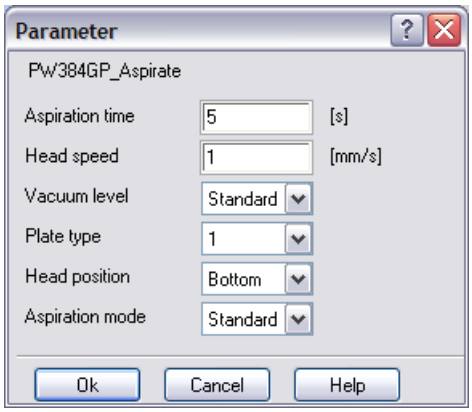

Fig. 16-42 *PW384GP Washer Aspirate command*

Aspiration time

Specify how long the vacuum valve remains open once the aspiration bottom position has been reached.

Head speed

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

Vacuum level

Specify the required vacuum level. The vacuum level determines the aspiration speed.

Plate Type

The PW384GP washer can store parameter sets for up to 15 different type of labware. The parameter sets are created using the menus on the washer's LCD panel. Select the parameter set you want to use for aspirating. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

Head position

Choose the required head position when aspirating.:
Bottom: The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.
Cell: The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions "Bottom" and "Cell" are configured in the washer with the plate parameters.

Aspiration mode

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Aspirate command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *PW384GP* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.18.2 PW384GP Washer - Dispense Command

The Dispense command starts the liquid dispensing procedure of the washer. This command is mainly intended for special applications, e.g. to fill the wells with liquid.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

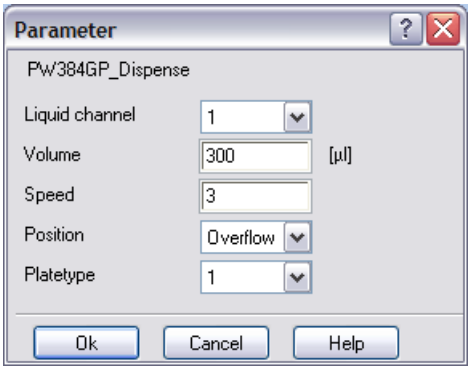

Fig. 16-43 *PW384GP Washer Dispense command*

Liquid channel

Choose the channel (liquid container) which contains the required washing liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

Volume

Specify the volume (in µl) to be dispensed. The volume depends on the labware type.

Speed

Specify the required dispense speed (range: 1 to 5). Choose “1” for drip mode.

Head position

Choose the required head position when dispensing:
Overflow: The aspiration needles are slightly below the shoulder (top edge) of the wells.
Cell: The aspiration needles are slightly above the bottom of the wells. Note: The needle positions “Overflow” and “Cell” are configured in the washer with the plate parameters.

Plate Type

The PW384GP washer can store parameter sets for up to 15 different type of labware. The parameter sets are created using the menus on the washer’s LCD panel. Select the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Dispense command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *PW384GP* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.18.3 PW384GP Washer - Prime Command

Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure.

Priming can take several minutes so you should start priming with this command at an early stage in your script or process to make sure that the washer is ready when you want to use it.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

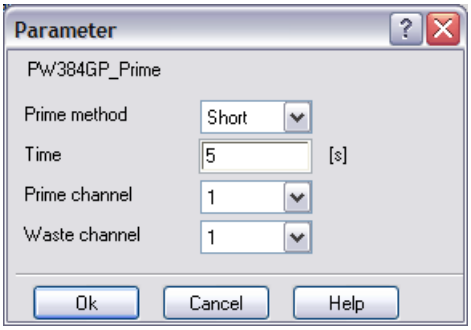

Fig. 16-44 *PW384GP Washer Prime command*

Prime method

Choose the required prime method:
Full: In this mode, first the dispense needles are flushed. Then the waste tub is filled with liquid. After that the head is lowered into the liquid and the aspirate needles are flushed.
Short: In this mode, only the dispense needles are flushed. Short priming is normally carried out using the same liquid which will be used in the wash or dispense command which follows the prime command.

Time

Specify how long to prime in seconds.

Prime channel

Choose the channel (liquid container) which contains the required priming liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

Waste channel

Choose the channel (liquid container) you want to use for the waste liquids.

This command has no objects, pre-actions or post-actions.

16.18.4 PW384GP Washer - Rinse Command

The Rinse command starts the rinsing procedure of the washer to flush the liquid system.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

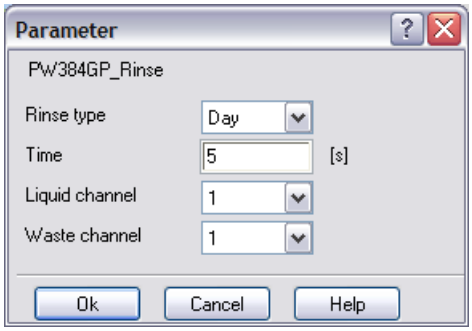

Fig. 16-45 *PW384GP Washer Rinse command*

Rinse mode

Choose the required rinsing mode:

Day mode should be used if the washer will be or has been left standing for a least one hour. Day mode rinsing is normally carried out with wash liquid. Use distilled water instead if the washer has been unused for longer than two hours.

Night mode should be used at the end of the day to thoroughly rinse the liquid system and leave the manifold (wash head) soaking in the waste sink. Rinsing is then repeated automatically after one hour. Thereafter, the liquid level is topped up every 6 hours to compensate for evaporation. Night mode rinsing is normally carried out with distilled water.

Time

Specify how long to rinse in seconds (day mode rinsing only). This setting is ignored for night mode rinsing. Night mode rinsing is carried out indefinitely until you re-start Freedom EVOware (which initializes the washer) or use a Stop command (see 16.18.5 “PW384GP Washer - Stop Command”, 16-58). If you plan to leave Freedom EVOware and the washer running overnight, the first washer command in your script or process on the following day should be a Stop command. Note: Night mode rinsing is not interrupted if you exit Freedom EVOware and/or switch off the PC.

Liquid channel

Choose the channel (liquid container) which contains the required washing liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

Waste channel

Choose the channel (liquid container) you want to use for the waste liquids.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

This command has no objects, pre-actions or post-actions.

16.18.5 PW384GP Washer - Stop Command

The Stop command stops the washing or rinsing procedure.

This command has no execution parameters or objects, pre-actions or post-actions.

16.18.6 PW384GP Washer - PrepareEmptyWaste Command

The PrepareEmptyWaste command collapses the vacuum in the waste bottle to allow it to be emptied. This needs to be done whenever the washer's liquid detection indicates that the waste bottle is full.

This command has no execution parameters or objects, pre-actions or post-actions.

16.18.7 PW384GP Washer - DownloadWash Command

The PW384GP washer can store parameter sets for up to 49 different wash programs. The DownloadWash command is used to configure a wash program and download it to non-volatile memory in the washer. The stored wash program can then be executed with the StartWash command. All of the wash programs downloaded with this command have the name "generic" (the name can be displayed on the LCD panel of the washer).

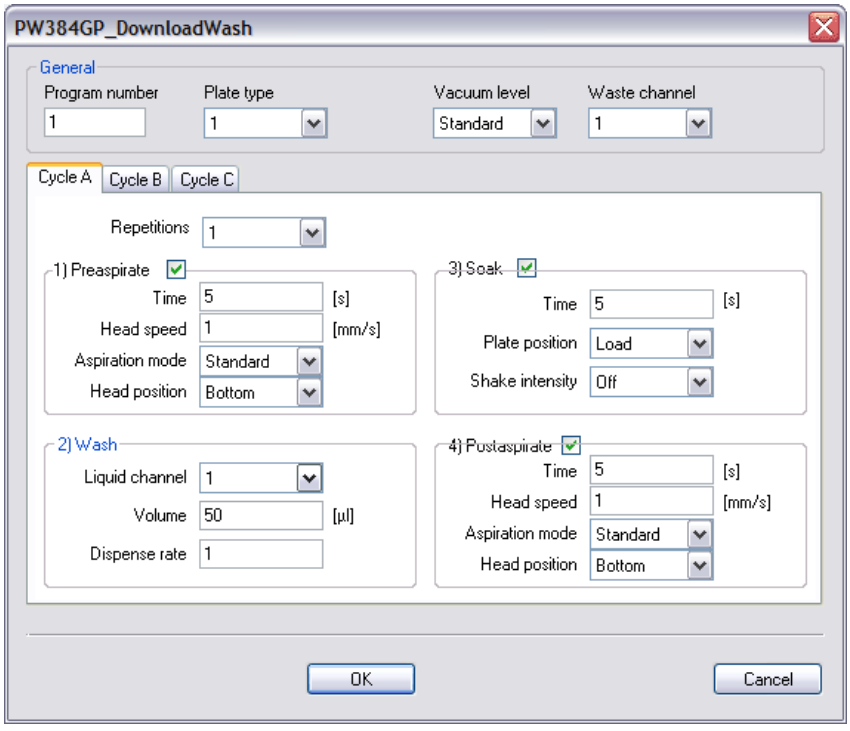

Fig. 16-46 *PW384GP Washer DownloadWash command*

General panel

Storage address

Specify the required address of the wash program (range: 1 to 49). If you specify the address of a wash program which already exists in the washer, it will be overwritten by the new wash program.

Plate Type

The PW384GP washer can store parameter sets for up to 15 different type of labware. The parameter sets are created using the menus on the washer's LCD panel. Select the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

Vacuum level

Specify the required vacuum level. The vacuum level determines the aspiration speed.

Waste channel

Choose the channel (liquid container) you want to use for the waste liquids from the aspiration steps.

Cycle A/B/C

The following parameters can be set separately for each of three washing cycles A, B and C. Click the corresponding tab to configure the settings for each cycle. Each cycle consists of a wash operation and optional pre-aspirate, soak and post-aspirate steps.

Repetitions

Specify the number of repetitions for the selected cycle. Cycle A must executed at least once. Set Repetitions to zero in cycle B and C if you only want Cycle A to be executed.

Pre-aspirate panel

Check the pre-aspiratecheckbox if you want to aspirate before washing. This can be done to remove sample or reagent liquids from the wells before starting the wash procedure.

Aspiration time

Specify how long to aspirate before the wash cycle starts.

Head speed

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

Aspiration mode

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

Head position

Choose the required head position when aspirating:
Bottom: The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.
Cell: The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions "Bottom" and "Cell" are configured in the washer with the plate parameters.

Wash panel

During the wash step, the aspiration needles are slightly below the shoulder (top edge) of the wells (overflow position). The needle position “Overflow” is configured in the washer with the plate parameters.

Wash channel

Choose the channel (liquid container) which contains the required washing liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

Wash volume

Specify the volume (in µl) of liquid to be used for the wash process.

Dispense rate

Specify the required speed of the dispensing pump.

Soak panel

Check the *Soak* checkbox if you want to soak the microplate after dispensing the wash liquid. You can also shake the microplate while soaking.

Soak time

Specify the required soak time in seconds.

Plate position

Choose the required plate position while soaking:
Load: The transport sledge is in the home position during soaking.
Wash: The transport sledge is under the wash head during soaking.

Shake intensity

Choose the required intensity of shaking while soaking. Choose Off to disable shaking.

Post-aspirate panel

Check the *Post-aspirate* checkbox if you want to aspirate after washing. This can be done to remove remaining liquid from the wells after the washing procedure.

Time

Specify how long to aspirate after the wash cycle has finished.

Head speed

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

Aspiration mode

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

Head position

Choose the required head position when aspirating:
Bottom: The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.
Cell: The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions “Bottom” and “Cell” are configured in the washer with the plate parameters.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.
This command has no objects, pre-actions or post-actions.

16.18.8 PW384GP Washer - StartWash Command

The PW384GP washer can store parameter sets for up to 49 different wash programs. The StartWash command is used to execute one of the stored wash programs.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

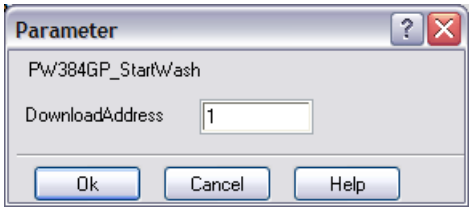

Fig. 16-47 *PW384GP Washer StartWash command*

Download address

Specify the address of the wash program (range: 1 to 49). You must store the wash program in the washer (e.g. with the DownloadWash command) before using the StartWash command. Wash programs are stored in the washer in non-volatile memory.

Objects

The StartWash command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *PW384GP* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.18.9 PW384GP Washer - Wash Command

The WashPlate command performs the washing of a microplate with specified parameters such as wash volume and aspiration time.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

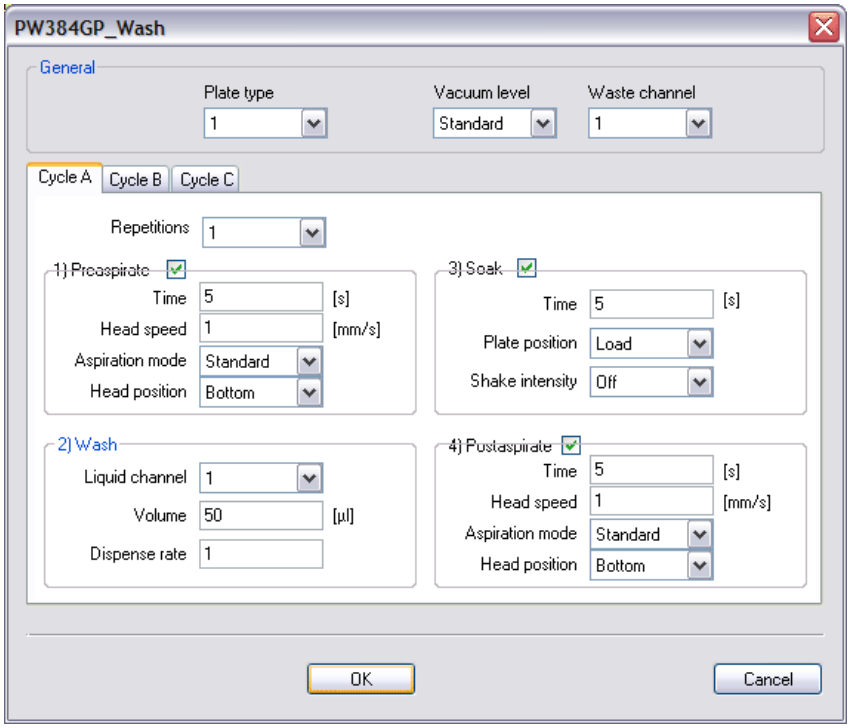

Fig. 16-48 *PW384GP Washer Wash command*

General panel

Plate Type

The PW384GP washer can store parameter sets for up to 15 different type of labware. The parameter sets are created using the menus on the washer's LCD panel. Select the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

Vacuum level

Specify the required vacuum level. The vacuum level determines the aspiration speed.

Waste channel

Choose the channel (liquid container) you want to use for the waste liquids.

Cycle A/B/C

The following parameters can be set separately for each of three washing cycles A, B and C. Click the corresponding tab to configure the settings for each cycle. Each cycle consists of a wash operation and optional pre-aspirate, soak and post-aspirate steps.

Repetitions

Specify the number of repetitions for the selected cycle. Cycle A must executed at least once. Set Repetitions to zero in cycle B and C if you only want Cycle A to be executed.

Pre-aspirate panel

Check the pre-aspiratecheckbox if you want to aspirate before washing. This can be done to remove sample or reagent liquids from the wells before starting the wash procedure.

Aspiration time

Specify how long to aspirate before the wash cycle starts.

Head speed

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

Aspiration mode

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

Head position

Choose the required head position when aspirating:
Bottom: The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.
Cell: The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions “Bottom” and “Cell” are configured in the washer with the plate parameters.

Wash panel

During the wash step, the aspiration needles are slightly below the shoulder (top edge) of the wells (overflow position). The needle position “Overflow” is configured in the washer with the plate parameters.

Wash channel

Choose the channel (liquid container) which contains the required washing liquid. Choose Rinse if you want to use the rinsing liquid (normally distilled water).

Wash volume

Specify the volume (in µl) of liquid to be used for the wash process.

Dispense rate

Specify the required speed of the dispensing pump.

Soak panel

Check the *Soak* checkbox if you want to soak the microplate after dispensing the wash liquid. You can also shake the microplate while soaking.

Soak time

Specify the required soak time in seconds.

Plate position

Choose the required plate position while soaking:
Load: The transport sledge is in the home position during soaking.
Wash: The transport sledge is under the wash head during soaking.

Shake intensity

Choose the required intensity of shaking while soaking. Choose Off to disable shaking.

Post-aspirate panel

Check the *Post-aspirate* checkbox if you want to aspirate after washing. This can be done to remove remaining liquid from the wells after the washing procedure.

Time

Specify how long to aspirate after the wash cycle has finished.

Head speed

Specify the required head speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

Aspiration mode

Select the required aspiration mode (standard or crosswise). Crosswise aspiration should only be used for 96-well plates with flat bottomed wells. In this case, aspiration is carried out with the needles at two positions in each well (front edge and back edge). This ensures the minimum volume of residual liquid. For more information, please refer to the corresponding section in the operating manual of your washer.

Head position

Choose the required head position when aspirating:
Bottom: The aspiration step is performed down to the bottom of the wells to ensure the minimum volume of residual liquid.
Cell: The aspiration step is only performed down to a predefined height to leave a small amount of liquid in the wells. This setting is useful for cell washing. Note: The needle positions “Bottom” and “Cell” are configured in the washer with the plate parameters.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The WashPlate command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *PW384GP* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.19 Commands for the 96PW Washer

The Tecan 96PW Washer is a fully automated microplate washer for all types of 96-well microplates. The device is fitted with a 96-well wash head, which has one aspirating and one dispensing needle per well. The plate carrier is adjustable to enable the use types of round and flat bottom microplates. The device is also equipped with a mirror so that visual quality control can be performed during the washing procedure. By treating all 96 wells of the microplate simultaneously, the washer is able to achieve very short wash times.

16.19.1 96PW Washer - WashPlate Command

The WashPlate command performs the washing of a microplate with specified parameters such as wash volume and aspiration time.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

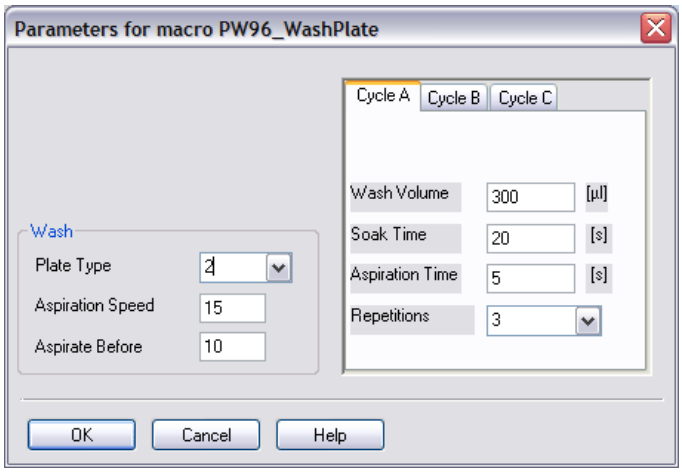

Fig. 16-49 *96PW Washer WashPlate command*

Wash panel

Plate Type

The 96PW washer can store parameter sets for up to eight different type of labware. The parameter sets are created using the menus on the washer's LCD panel. Select the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

Aspiration Speed

Specify the required aspiration speed (range: 1 to 20 mm/s). This is the speed at which the needles are lowered into the wells as the liquid level drops.

Aspirate Before

Specify how long to aspirate before the first wash cycle starts. This can be done to remove sample or reagent liquids from the wells before starting the wash procedure. Specify 0 to disable this feature.

Cycle A/B/C

The following parameters can be set separately for each of three washing cycles. Click the corresponding tab to switch to the settings for each cycle.

Wash Volume

Specify the volume (in µl) of liquid to be used for the wash process.

Soak Time

Specify the required soak time in seconds.

Aspiration Time

Specify the required aspiration time in seconds.

Repetitions

Specify the number of repetitions for this cycle. Cycle A must executed at least once. Set Repetitions to zero in cycle B and C if you only want Cycle A to be executed.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The WashPlate command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *96PW* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.19.2 96PW Washer - Dispense Command

The Dispense command starts the liquid dispensing procedure of the washer. This command is mainly intended for special applications, e.g. to fill the wells with liquid.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

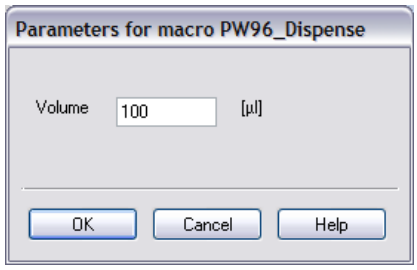

Fig. 16-50 *96PW Washer Dispense command*

Volume

Specify the volume (in µl) to be dispensed.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Dispense command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *96PW* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.19.3 96PW Washer - Aspirate Command

The Aspirate command starts the aspiration procedure of the washer. This command is mainly intended for special applications, e.g. to remove sample or reagent liquids from the wells.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

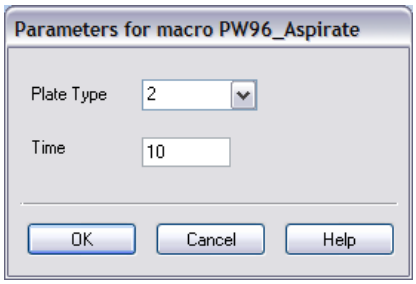

Fig. 16-51 *96PW Washer Aspirate command*

Plate Type

The 96PW washer can store parameter sets for up to nine different types of plates. The parameter sets can be created using the menus on the washer's LCD panel. Select the parameter set you want to use for washing. For information on parameter sets please refer to the corresponding section in the operating manual of your washer.

Time

Specify the required aspiration time in seconds.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Aspirate command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *96PW* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.19.4 96PW Washer - Prime Command

Before the washer is used, all dispensing channels needed for the wash step must be primed to fill the liquid system with the required liquid. The Prime command starts the priming procedure.

Priming can take several minutes so you should start priming with this command at an early stage in your script or process to make sure that the washer is ready when you want to use it.

This command has no execution parameters or objects, pre-actions or post-actions.

16.19.5 96PW Washer - Rinse Command

The Rinse command starts the rinsing procedure of the washer to flush the liquid system.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

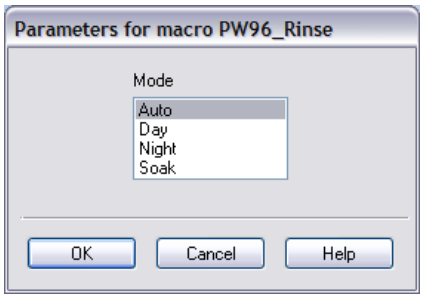

Fig. 16-52 *96PW Washer Rinse command*

Mode

Specify the mode to be used for rinsing. Four modes are available:

Soak mode should be used if the washer will be left standing for a short time only (less than one hour). You can rinse the system with either distilled water or wash solution.

Day mode should be used if the washer will be or has been left standing for a least one hour. Day mode rinsing is normally carried out with wash liquid. Use distilled water instead if the washer has been unused for longer than two hours.

Night mode should be used at the end of the day to thoroughly rinse the liquid system and leave the manifold (wash head) soaking in the waste sink. Night mode rinsing is normally carried out with distilled water.

Auto mode is the same as day mode except that rinsing is automatically repeated after a specified amount of time (1 to 24 hours). The auto-rinse repeat time is configured using the washer's LCD panel.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.19.6 96PW Washer - Remote Command

The Remote command switches the device from local mode to remote mode. The device can only be controlled remotely by Freedom EVOware (through the interface cable) in remote mode.

This command has no execution parameters or objects, pre-actions or post-actions.

16.19.7 96PW Washer - ExitRemote Command

The ExitRemote command switches the device from remote mode to local mode. The device can not be controlled remotely by Freedom EVOware (through the interface cable) in local mode. Using this command will disconnect the device from the Freedom EVOware software.

This command has no execution parameters or objects, pre-actions or post-actions.

16.19.8 96PW Washer - Status Command

The Status command interrogates the status of the washer. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.20 Commands for the PosID-3

The PosID-3 (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. The PosID-3 supersedes the PosID and has configurable features which allow it to scan a wider range of custom carrier and labware types. Unlike fixed barcode scanners, it does not need a robot to bring the labware to it. The PosID-3 is installed at the rear of the pipetting instrument and is provided with a gripper which pulls the carrier towards the rear for barcode identification and then slides the carrier back into the pipetting position. The scanning head hinges to read barcodes which are attached to horizontal or vertical surfaces. Barcodes can be read on both the primary side (e.g. sample tube) and the secondary side (e.g. microplates).

Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.26 “Export Data Command”, 15-48).

16.20.1 PosID-3 - Initialize Command

The Initialize command initializes the PosID-3. You must initialize the hardware with this command before you use the other commands for this device.

This command has no execution parameters or objects, pre-actions or post-actions.

16.20.2 PosID-3 - Scan Command

The Scan command is used to read the barcode labels on one or more pieces of labware using the PosID-3 option. The corresponding carrier or tube rack barcodes will also be scanned.

If you are using the PosID-3 for general purpose applications in a regulated environment, you must activate the Double Blind Entry feature in the PosID-3 configuration (see 8.5.19.2 “PosID-3 Configuration - Settings Tab”, 8-80).

Execution parameters

The Scan tab lets you choose the labware you want to scan and the Barcode types tab is used to configure the barcode types which the PosID-3 scanner will accept for the chosen labware:

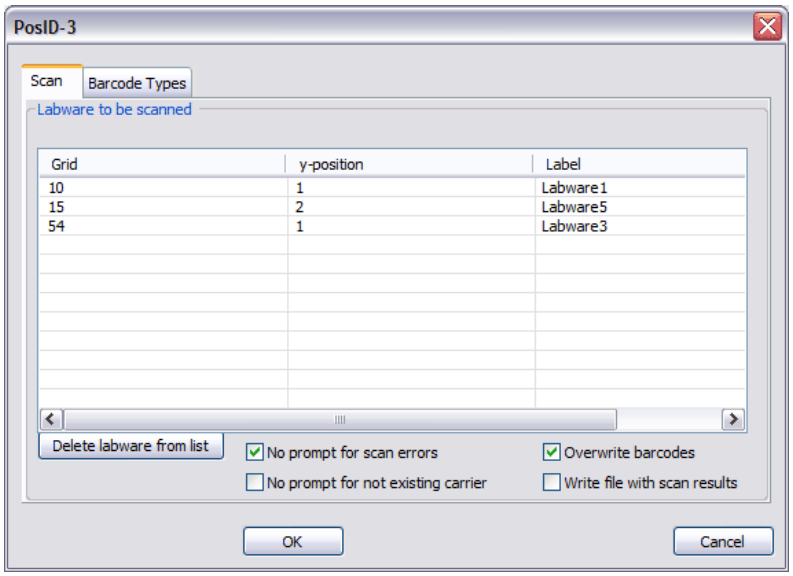

Fig. 16-53 *PosID-3 command (Scan tab)*

The parameters of the PosID-3 command are as follows (Scan tab):

Labware to be scanned

This shows the labware which Freedom EVOware will scan with this command. Click on a labware item in the Worktable Editor to add it to the list. The corresponding carrier or tube rack barcodes will also be scanned and do not need to be specified.

Delete labware from list

To remove labware from the list, select the corresponding line and click this button.

No prompt for scan errors

If this option is enabled, Freedom EVOware does not display an error message if a barcode could not be read.

If the carrier barcode cannot be read, the tubes or labware on this carrier won't be scanned either and are assigned default barcodes. The default barcode for labware is the grid position followed by an underscore (_) and the site number. The default barcode for tubes is the grid position followed by an underscore (_) and the tube number.

The default barcode for carriers or tube racks is the carrier code followed by an underscore (_) and the grid position. The grid position is padded to 6 digits with leading zeros. The carrier code is a 3-digit code which indicates the carrier type. Example: 013_000015.

If the carrier barcode can be read but a tube barcode cannot be read, Freedom EVOware assigns a default barcode which consists of three stars (***). If the tube is missing, Freedom EVOware assigns a default barcode which consists of $$$.

No prompt for not existing carrier

If this option is enabled, Freedom EVOware does not display an error message if the carrier specified in the PosID-3 command was not found on the worktable at the specified grid position.

Overwrite barcodes

If the same labware item is scanned twice, Freedom EVOware will display an error message if the two scanned barcodes differ. It is not normally necessary to scan same labware item twice, but you may want to do this as a security check (by specifying the PosID-3 command twice) to make sure that the same labware item or tube is still present on the worktable. Depending on the settings you have made, Freedom EVOware also scans the same labware twice If a barcode could not be read.

Check the *Overwrite barcodes* checkbox to switch off this security feature. In this case, if the two barcodes differ, the first barcode will be overwritten by the second barcode without displaying an error.

Write file with scan results

If this option is enabled, a report file is created with the scanned barcodes. The filename is scan.csv and it is written to the configured Output directory (default path <install_path>\Output). Existing files with the same name are overwritten. The file contains one line per scanned labware or tube barcode.

For information on the sytax of this file see A.2.2 “Barcode file written by the PosID and PosID-3 commands”, A-13.

16.20.2.1 PosID-3 Command (Barcode Types Tab)

The Barcode Types tab of the PosID-3 command is used to configure the barcode types which the PosID-3 scanner will accept for the chosen labware:

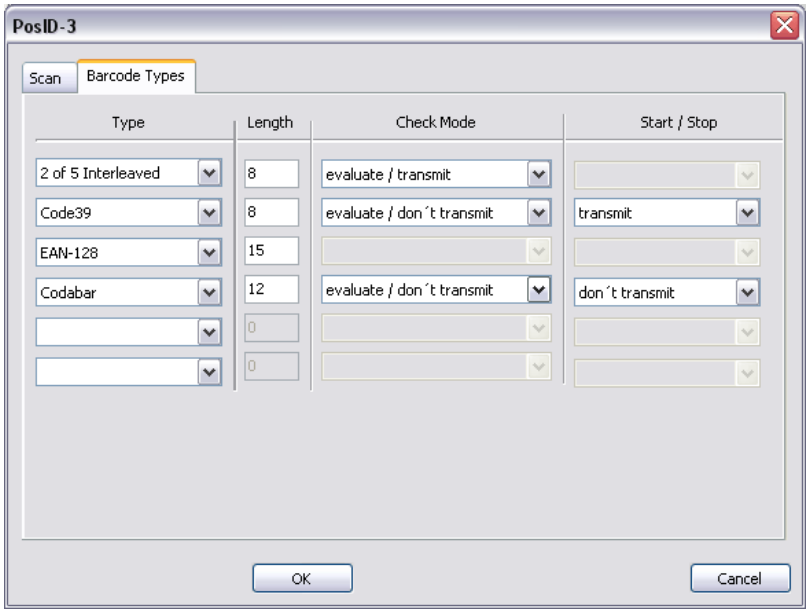

Fig. 16-54 *PosID-3 command (Barcode types tab)*

The parameters of the PosID-3 command are as follows (Barcode Types tab):

Type

Choose the barcodes types which will be accepted by the PosID-3 scanner from the popup lists. You should only choose the barcode types which are being used on the barcode labels. This makes it easier for the scanner to identify incorrect barcodes. The PosID-3 will report an error if it finds a barcode type which you have not chosen.

Some of the barcode types have additional settings as follows:

Length

0	Do not check the length of the barcode.
1..30	The length of the barcode must match this value (the checksum and start/stop code are also counted). Barcodes with different lengths will be ignored.

Check Mode

empty	Do not check the checksum.
evaluate / transmit	The checksum is checked and is reported to Freedom EVOware as part of the barcode.
evaluate / don't transmit	The checksum is checked but not reported.

Start/Stop

empty	A start/stop code is not required.
transmit	A start/stop code is required and is reported to Freedom EVOware as part of the barcode.
don't transmit	A start/stop code is required but not reported.

16.21 Commands for the REMP PHS

The REMP PHS (Portrait Heat Sealer) is used to heat seal microplates using a special REMP sealing foil. Refer to the REMP user manual for a list of microplate types which are supported and the plate adapters which must be used for different microplate types.

The REMP ADI software, which must be installed separately, communicates with the PHS through an RS232 port. The Freedom EVOware driver for the PHS communicates with the ADI software using ActiveX.

To allow Freedom EVOware to control the PHS device, the ADI software must be running. In addition, the PHS must be switched to remote mode using the function keys and menus on the device. Refer to the REMP User Manual for more information.

To start the ADI software, choose Start > All Programs > Remp > Remp ADI Stand-Alone.

The Freedom EVOware installation program installs Freedom EVOware drivers and a device carrier for the PHS. The REMP ADI software installation CD is packaged with the device. The recommended program installation directory for the ADI software is C:\Program Files\Tecan\Remp.

REMP ADI Software

A single installation of the ADI software can be used to control several different REMP devices such as the ACD96 Automated Capper Decapper and the PHS Portrait Heat Sealer. After installing the ADI software, you must install driver(s) for the REMP devices you want to use.

To do this, start the ADI software and choose Install New Device in the File menu. Select the required device from the list, and click Next. Then specify the device name “RempPHS” (specify the device name exactly like this). Then click *Next* and click *Finished* in the following dialog box.

Then configure the RS232 port to which the PHS is connected. To do this, connect the PHS to the PC and switch it on, switch it to remote mode using the function keys and menus on the device and choose Settings in the Device menu of the ADI software. Refer to the REMP documentation for more information.

The Available Device pull-down list shows all of the device drivers which have been installed in the ADI software.

16.21.1 REMP PHS - SealPlate Command

The SealPlate command applies the sealing foil to the microplate using heat and pressure. The plate feeder mechanism removes the microplate from the device again after sealing.

Before using this command, the microplate must be put on the plate adapter of the PHS using the RoMa.

16.22 Commands for the REMP Reatrix

The REMP Reatrix 2D Barcode Scanner is used to scan the 2D tube barcodes and the tube rack barcode of REMP STBR96 tube racks. Each tube rack holds 96 REMP tubes. The REMP Reatrix software, which must be installed separately,

communicates with the Reatrix Barcode Scanner through two RS232 ports. The Freedom EVOware driver for the Reatrix communicates with the REMP Reatrix software using TCP/IP (default port 6054).

The Freedom EVOware installation program installs Freedom EVOware drivers and a device carrier for the Reatrix. The REMP Reatrix software installation CD is packaged with the device.

To allow Freedom EVOware to control the Reatrix Barcode Scanner, the REMP Reatrix software must be running. In addition, you must switch the Reatrix software to remote mode by choosing Remote Mode in the Edit menu.

To start the REMP Reatrix software, choose Start > All Programs > Reatrix > Reatrix.

Note: *If you restart the PC or the Reatrix software, you must choose remote mode again (the setting is not saved).*

The recommended installation directory for the Reatrix software is C:\Program Files\Tecan\Remp\Reatrix.

Configuring the REMP Reatrix software

After installing the Reatrix software, it needs to be suitably configured for data exchange with Freedom EVOware. To do this, start the Reatrix software and choose System Settings in the Settings menu:

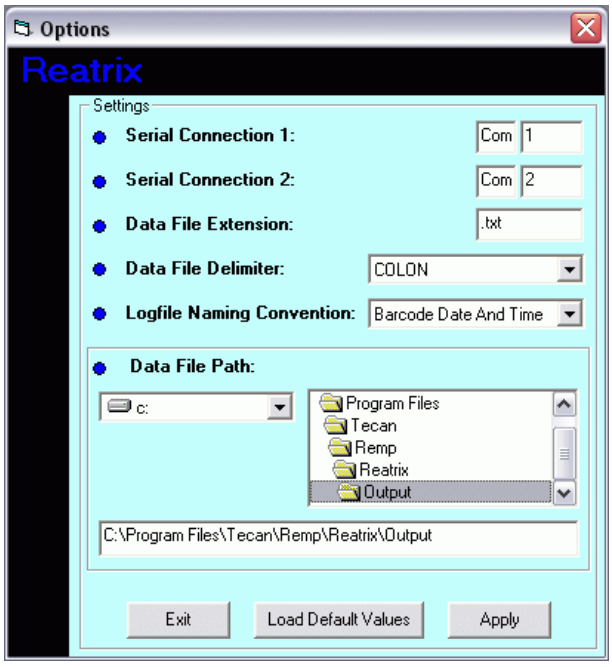

Fig. 16-55 *REMP Reatrix software - Settings*

Serial Connection 1 and 2

Choose the serial ports to which the REMP Reatrix is connected.

Data File Extension

Choose txt.

Data File Delimiter

Choose COLON.

Logfile Naming Conventions

Choose Barcode Date and Time.

Data File Path

Specific the path where the REMP log files should be saved. The log files which are written by the REMP software are not read by Freedom EVOware (Freedom EVOware receives the scanned data directly through the TCP/IP connection). Accordingly, you can specify any existing path.

Additional configuration settings can be made by editing the configuration file Reatrix.ini. Refer to the REMP User Manual for more information.

16.22.1 REMP Reatrix - Read Command

The Read command reads the 2D tube barcodes and the tube rack barcode of the REMP STBR96 tube rack which has been placed on the Reatrix barcode scanner:

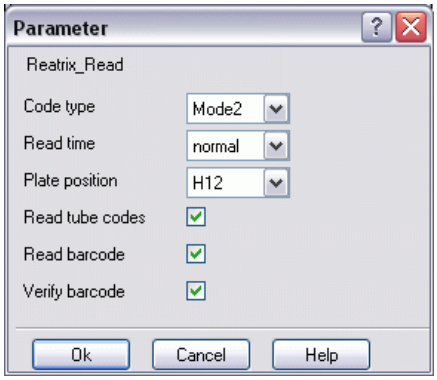

Fig. 16-56 *REMP Reatrix - Read command*

The parameters are as follows:

Code type

Choose the quality of the 2D barcodes on the tubes: Mode1 = High barcode quality; Mode2 = Medium barcode quality; Mode3 = Low barcode quality. Scanning generally takes longer if you choose Mode3.

Read Time

Choose the reading speed of the 2D barcode scanner (short, medium or long). Choose long if the barcode quality is poor.

Plate position

The tube rack barcode of REMP STBR96 tube racks is normally fitted on the side of the tube rack adjacent to tube position H12 (choose H12 in the pull-down list). Choose A1 if the carrier barcode is adjacent to tube position A1.

Note: *The REMP tube rack should always be placed on the Reatrix barcode scanner with the tube rack barcode towards the barcode scanner at one end of the device (the 2D tube barcodes are scanned from below using an additional barcode scanner).*

Read tube codes

Check this checkbox if you want to read the 2D tube barcodes.

Read barcode

Check this checkbox if you want to read the tube rack barcode.

Verify barcode

Check this checkbox if you want to read the 2D tube barcodes and compare them with existing barcode information in Freedom EVOware. The script or process is stopped with an error message if the barcodes do not match.

16.22.2 REMP Reatrix - Initialize Command

The Initialize command initializes the Reatrix. You must initialize the hardware with this command before you use other commands for this device.

16.23 Commands for the REMP ACD96

The REMP ACD96 Automated Capper Decapper is used to fit or remove sealing caps from REMP tubes in REMP STBR96 tube racks. Each tube rack holds 96 REMP tubes. Refer to the REMP user manual for information on the rack adapters which must be used for different REMP tube rack versions.

The REMP ADI software, which must be installed separately, communicates with the ACD96 through an RS232 port. The Freedom EVOware driver for the ACD96 communicates with the ADI software using ActiveX.

To allow Freedom EVOware to control the ACD96 device, the ADI software must be running. In addition, the ACD96 must be switched to remote mode using the function keys and menus on the device. Refer to the REMP User Manual for more information.

To start the ADI software, choose Start > All Programs > Remp > Remp ADI Stand-Alone.

The Freedom EVOware installation program installs Freedom EVOware drivers and a device carrier for the ACD96. The REMP ADI software installation CD is packaged with the device. The recommended program installation directory for the ADI software is C:\Program Files\Tecan\Remp

REMP ADI Software

A single installation of the ADI software can be used to control several different REMP devices such as the ACD96 Automated Capper Decapper and the PHS Portrait Heat Sealer. After installing the ADI software, you must install driver(s) for the REMP devices you want to use.

To do this, start the ADI software and choose Install New Device in the File menu. Select the required device from the list, and click Next. Then specify the device name “REMP ACD” (specify the device name exactly like this). Then click *Next* and click *Finished* in the following dialog box.

Then configure the RS232 port to which the ACD96 is connected. To do this, connect the ACD96 to the PC and switch it on, switch it to remote mode using the function keys and menus on the device and choose Settings in the Device menu of the ADI software. Refer to the REMP documentation for more information.

The Available Device pull-down list shows all of the device drivers which have been installed in the ADI software.

16.23.1 REMP ACD96 - Cap Command

The Cap command fits caps to 96 REMP tubes in the REMP STBR96 tube rack. Before fitting the caps, they are held by a mechanism inside the ACD96. Before using this command, the STBR96 tube rack must be put on the rack adapter of the ACD96 using the RoMa.

The Cap command can also be used to put caps into the optional REMP cap holder. The cap holder, which can be put down on the worktable of the pipetting instrument or in the Tecan carousel, can be used as a temporary storage for caps which have been removed.

16.23.2 REMP ACD96 - Decap Command

The Decap command removes the caps from 96 REMP tubes in the REMP STBR96 tube rack. After removing the caps, they are held by a mechanism inside the ACD96. Before using this command, the STBR96 tube rack must be put on the rack adapter of the ACD96 using the RoMa.

The Decap command can also be used to pick up caps from the optional REMP cap holder. The cap holder, which can be put down on the worktable of the pipetting instrument or in the Tecan carousel, can be used as a temporary storage for caps which have been removed.

16.24 Commands for the Process Starter

The Process Starter device driver starts a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations and/or on the values of variables. Alternatively, you can start a specified process unconditionally.

The Process Starter is only available for Freedom EVOware Plus. It can also start Freedom EVOware processes on remote computers.

16.24.1 Process Starter - Start Command

The Start command starts a single instance of a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations (labware attributes) and/or on the values of variables. Alternatively, you can start a specified process unconditionally.

The Start command can be used as a process step or as a script command in a Process Script process step. It is only available for Freedom EVOware Plus. It can also be used to start Freedom EVOware processes on a remote computer.

The Start command is available in five versions (Start and StartP1 to StartP4), depending on the number of labware items required by the processes you want to start (0 to 4 labware items). The Start command has no labware parameters and the StartP1 to StartP4 commands have from one to four labware parameters. If you assign labware sources to the StartP1 to StartP4 commands in the Process Editor, you can configure the command to pass the labware parameters to the processes you want to start. See Plate Mapping panel, below.

You can only use StartP1 to StartP4 as process steps. The Start command can be used as a process step or in scripts for the Process Script - Script command.

The five Start commands do not wait for the started processes to finish. If necessary, you can use the script command WaitForProcess to pause the execution of a pipetting script until a specified process has finished (see 16.24.2 “Process Starter - WaitForProcess Command”, 16-82). The WaitForProcess commands can only be used in scripts for the Process Script - Script command.

The dialog box of the Start commands is as follows (the example shows StartP2):

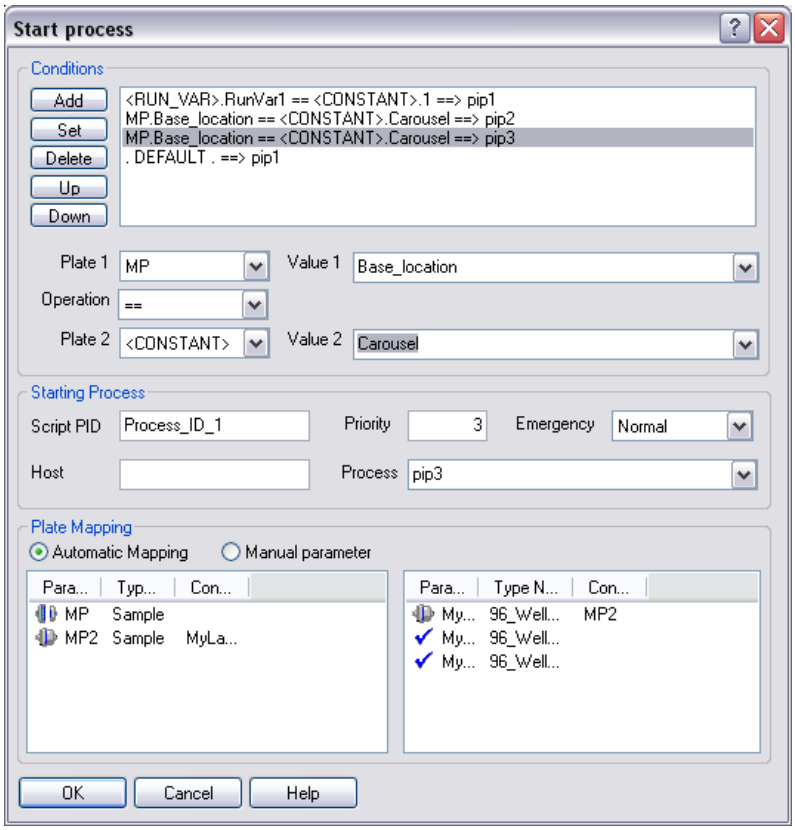

Fig. 16-57 *Process Starter - StartP2 command*

The parameters of the Start command are as follows:

Conditions panel

Specify the conditions which must be met to start the process or processes.

You can specify a single condition to start a single specified process or several different conditions, each of which starts a different process. If you do not specify any conditions, the process specified in the Starting Process panel will be started unconditionally.

When you run the process which contains the Start command, the conditions in the list are tested from the top downwards. The first true condition which is found is executed and the remaining conditions in the list are skipped.

Select a condition in the list to view and/or edit the settings for the condition in the pull-down lists and text fields.

The buttons and pull-down lists in the Conditions panel are as follows:

Add

Add a condition.

Set
If you have edited a condition, click Set to apply the changes.

Delete
Delete the selected condition.

Up, Down
Move the selected condition up or down in the list.

The available options for Plate 1/2 and Value 1/2 are as follows:

Tab. 16-1 *Options for Plate 1/2 and Value 1/2*

Plate1 / Plate 2	Value 1 / Value 2	Description
Labware name	Name of a labware attribute	Choose the required attribute from the pull-down list (the list shows valid attributes for labware items). You can also enter the attribute name manually in the Value 1 or Value 2 field.
<SCRIPT_VAR>	Name of an existing variable of scope “script” a)	Value of the specified variable. Specify the variable name in the Value 1 or Value 2 field.
<RUN_VAR>	Name of an existing variable of scope “run” a)	Value of the specified variable. Specify the variable name in the Value 1 or Value 2 field.
<INST_VAR>	Name of an existing variable of scope “instance” a)	Value of the specified variable. Specify the variable name in the Value 1 or Value 2 field.
<CONSTANT>	Constant	The value is used directly. Specify the value in the Value 2 field.

a) See 6.4.6 “Declare Variables”, 6-12.

The available options for Operator are as follows:

Tab. 16-2 *Expressions that can be used in the Start command*

Operator	Description
==	String is the same
!=	String is not the same
<	Numeric value is less than
>	Numeric value is greater than
DEFAULT	Always true

Starting Process panel

Script PID

This field is only required if you want to use the Process Starter - WaitForProcess command. Specify the name of a string variable of scope script, instance or run (as required).

When the Start command (or StartP1 to StartP4) starts a process, it will write the unique process ID of the process into this variable. If you have started a process on a remote PC, the process ID will be followed by the name of the remote host (e.g. 42:RemoteHost_2).

You must specify the same variable name in the Process ID field of the WaitForProcess command. The WaitForProcess command will then pause the execution of the pipetting script until the specified process has finished.

Priority

Required priority of the process to be started.

Emergency

Required emergency level of the process to be started.

Host

If you want to start a process on a remote PC, specify the name of the remote host.

Process

The name of the process to be started.

The pull-down list only shows processes from the local computer. If you choose a local process, the labware parameters of the process are shown in the right hand list of the Plate Mapping panel.

If you want to start a process on a remote computer, you must enter the process name and the plate mapping manually. The process must exist on the remote computer.

Plate Mapping panel

The list on the left side shows the labware parameters of the Start command. It will not contain any entries if you have chosen the Start command with no labware parameters; it will show 1 to 4 labware items if you have chosen StartP1 to StartP4.

The list on the right side shows the labware parameters of the process to be started.

Click a labware item in the right-hand list to connect it to the currently selected labware item in the left-hand list. Click a labware item in the right-hand list again to disconnect it.

If you connect a labware parameter in the right-hand list to a labware parameter in the left-hand list, the Start command will pass information on the labware to the called process (the process you want to start). The called process will then use the labware you assign to the Start command in the Process Editor instead of its own labware source.

For labware parameters in the called process which are not connected in this way, the called process will use the labware from its own labware source (the labware you assign to the called process in the Process Editor).

Different icons are used in the dialog box for the Start command to show how the labware is connected. In the above figure (Fig. 16-57, 16-79), the labware MP2 in the left-hand list is connected to the first entry in the right-hand list. The other two entries are not connected (blue tick). The labware MP in the left-hand list is also not connected.

Click the *Manual parameters* radio button to enter a labware assigment string instead of using the graphical interface in the Plate Mapping panel. The string you enter is passed to the called process without change. So the string must be in the correct format. A typically example is:

MyLabware001 MyLabware001{001}, MoreLabware_1 MyLabware001{002}

This string assigns the labware item MyLabware001{001} in the main process to labware source MyLabware001 in the called process and MyLabware001{002} in the main process to labware source MoreLabware_1 in the called process.

You need to do this if the called process is on a remote computer. The Process Starter cannot determine the labware requirements of a Freedom EVOware process on a remote computer automatically.

The Start command starts a single instance of the called process. If you want to start more than one instance you can use variables in the labware assigment string.

Using the Start command as a script command

The Start command can also be used in the pipetting script of a Process Script process step (see 16.39 “Commands for the Process Script Driver”, 16-126). In this case, the Plate 1 and Plate 2 pull-down lists only allow you to choose variables and constants for use in the conditions and not labware parameters.

Remote Processes

Please note the following limitations and conventions if the called process is on a remote computer:

- To start processes remotely, the correct permissions must be set for the DCOM component EvoApi. This is done in Control Panel > Administrative Tools > Component Services. Please contact Tecan support for additional information.
- The same user name and password combination which you are using on the local Freedom EVOware installation must be available on the remote Freedom EVOware installation.
- The locations which you use to transfer labware between the two Freedom EVOware systems must have the same type or name (e.g. Hotel 4Pos) and dimension (e.g. four sites).
- The labware you want to transfer to the remote computer must have the same name on both the local and the remote system (the names shown in the labware generator, see 11.6, 11-16 must be identical).
- The location of the labware is passed to the remote process without change (it is set to the same value as on the local system). Accordingly, the labware location on the remote system must be empty and the labware must not be in use. This must be ensured by the operator before starting the process. The Process Starter cannot check the availability of the labware and labware location on the remote computer automatically.
- To start and intialize the remote system correctly, It is recommended to create and run a simple dummy remote process such as an incubation.

16.24.2 Process Starter - WaitForProcess Command

The WaitForProcess script command waits for a specified process to finish before allowing the pipetting script to continue.

The WaitForProcess command is only available for Freedom EVOware Plus. You can only use it in a Process Script -Script process step.

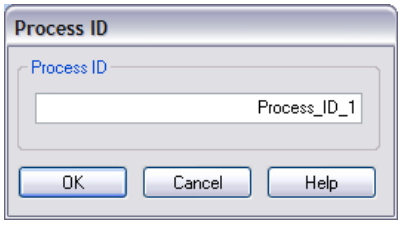

Fig. 16-58 *Process Starter - WaitForProcess command*

Process ID

Specify the name of an existing string variable which contains the process ID of a process to be started by the Process Starter - Start command. The WaitForProcess command will then pause the execution of the pipetting script until the specified process has finished.

The variable name must be identical to the variable name you specified in the Script PID field of the Process Starter - Start command.

16.25 Commands for the Tube Robot

The tube robot (also called PnP) is a robot arm equipped with special grippers that can pick up, transport and place small objects within the working area of the pipetting instrument. It is typically used to transport tubes with samples. Current Tecan pipetting instruments can be fitted with up to two PnP arms. Movements of the robot arms between different positions are called vectors.

16.25.1 Tube Robot - ExecuteScript Command

The ExecuteScript command is used to create a script for tube handling. When you drag it to the Process Editor, it opens the Script Editor. It does not allow you to use pipetting commands. The pipetting commands are specified in another script in the same process. You can exchange variables such as the tube counter or tube position with other scripts by declaring them with the scope *instance* or *run*. *See* 6.4.6 “Declare Variables”, 6-12 and 11.4.2 “Creating a Pipetting Script”, 11-5.

If you want to use this command, make sure that you have set the I/O Status for the Tube Robot to ON in the Configuration Tool.

16.26 Commands for the Plate Robot

The Plate Robot (also called the RoMa) is a robot arm equipped with special grippers that can pick up, transport and place objects within the working area of the pipetting instrument. It is typically used to transport microplates, reagent blocks, deep well plates, etc. between carriers, incubators and storage positions (e.g. a RoMa shelf or Carousel).

Current Tecan pipetting instruments can be fitted with up to two RoMas. Standard arm versions can handle objects on or above the worktable. Long arm (long z)

versions can also access objects which are positioned lower than the worktable, for example the Hettich Centrifuge. Movements of the robot arms between different positions are called vectors.

RoMa versions are available with offset gripper fingers (RoMa eccentric) and symmetrical gripper fingers (RoMa centric). The type to use is chosen according to the accessibility of the object to be gripped.

You do not need to (and cannot) specify the RoMa type in the Freedom EVOware configuration. However, you must re-teach the robot movement commands (RoMa vectors) if you exchange the robot arm for a different type. The RoMa vectors supplied with Freedom EVOware have been designed for RoMa eccentric.

16.26.1 Plate Robot - ExecuteSingleVector Command

The ExecuteSingleVector command executes a predefined movement from one position on the worktable to another (a RoMa vector). The vector can also be executed in reverse and the grippers can be opened or closed before and/or after the move.

This command is intended for RoMa vectors which are not used to move labware. In Freedom EVOware Plus, RoMa vectors which are used to move labware are normally carried out automatically. In Freedom EVOware Standard, use the RoMa Vector script command if you want to execute a robot vector (see 15.58 “RoMa Vector Command”, 15-141).

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

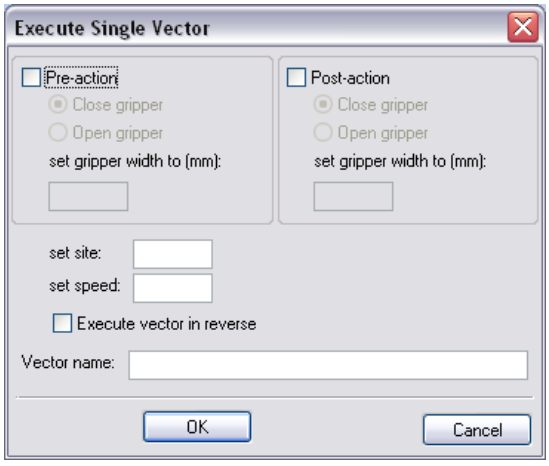

Fig. 16-59 *Plate Robot ExecuteSingleVector command*

Pre-action / Post-action

Check the Pre-action checkbox if you want to close or open the gripper before execution of the movement vector. Check the Post-action checkbox if you want to close or open the gripper after execution of the movement vector. Then click *Close gripper* or *Open gripper* as required.

Set gripper width to

Specify the width to which the gripper should be closed or opened (range: 60 to 140 mm).

Set site

Specify the site to execute the vector on. Specify this as “carrier site - 1”. For example, specify “0” to execute the vector on carrier site 1.

Set speed

Specify the plate robot movement speed with which to execute the vector (range 1 to 400 mm/s).

Execute vector in reverse

Check this checkbox if you want to execute the vector in reverse (from its end point to its start point).

Vector Name

Specify the name of the vector to execute. The vector must already be defined. Click the Robot Vectors tab in the Control Bar to see a list of the robot vectors which are not associated with carriers or labware items. If your pipetting instrument is fitted with two plate robots, specify a vector which has been created for the plate robot (1 or 2) that you want to use with this command.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.26.2 Plate Robot - Initialize Command

The Initialize command initializes the plate robot. You must initialize the hardware with this command before you use the other commands for this device.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

16.26.3 Plate Robot - MoveObject Command

The MoveObject command moves an object (e.g. labware) to a specified location.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

16.26.4 Plate Robot - ReplaceObject Command

The ReplaceObject command moves an object (e.g. labware) to a specified location. If the destination is occupied, the blocking object will be removed. It is mainly used for moving reagent carriers. The ReplaceObject command must not have a corresponding post-action.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

16.26.5 Plate Robot - MoveToBase Command

The MoveToBase command moves an object (plate) to its base (labware source) position.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

16.26.6 Plate Robot - ChangeObject Command

The ChangeObject command moves an object to a specified location. If the destination is occupied, the blocking object will be removed. The ChangeObject command must not have a corresponding post-action. It is only used for changing DiTi's and is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

16.26.7 Plate Robot - MoveInsert Command

The MoveInsert command moves the insert of an Insert Plate to the specified location.
This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

16.26.8 Plate Robot - SwapInsert Command

The SwapInsert command moves the insert of an Insert plate to another Insert plate which doesn't currently have an insert. After performing the operation, the Insert attribute of the source plate is set to 0 (= insert not fitted), and the Insert attribute of the destination plate is set to 1 (= insert is fitted).
This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

16.26.9 Plate Robot - ClearLocation Command

The ClearLocation command moves all objects which are currently at the specified location to a new location.
This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

16.27 Commands for the Safire Reader

The Tecan Safire is a multi-functional monochromator-based microplate reader. It provides high performance for the vast majority of today's microplate applications and research.
Safire provides you with the following measurement techniques:

- Fluorescence Intensity (FI) top/bottom
- Fluorescence Time Resolved (TRF) top/bottom
- Absorbance
- Quick Absorbance Scanning (optional)

Any standard microplates from 6-well to 384-well format can be measured with any of the above measurement techniques. Fluorescence measurement can be

made with up to 1536-well microplates (max. labware height 24.5 mm). Switching between measurement techniques and labware formats is fully automated.

The commands for this reader require the RdrOLE and XFluor4 software, which must be installed separately. Freedom EVOware can also control this reader using the Magellan software (see 16.16 “Commands for the Magellan option”, 16-48).

16.27.1 Safire Reader - Status Command

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.27.2 Safire Reader - Open Command

The Open command opens the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.27.3 Safire Reader - Close Command

The Close command closes the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.27.4 Safire Reader - Measure Command

The Measure command performs a measurement procedure using external software. For a detailed description of the parameters of this command please consult the documentation for RdrOLE and XFluor4.

Execution parameters

The RdrOLE reader interface software prompts you to specify the measurement parameters when you add this command to your script or process. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware’s offline mode, you must start RdrOLE and choose the reader manually.*

After making your entries in the Measurement Parameters dialog box and clicking **Ok**, the Output dialog box is shown where you must specify the name of the output file for the measurements. Alternatively, click Browse and choose an existing file. A default file name will be suggested automatically:

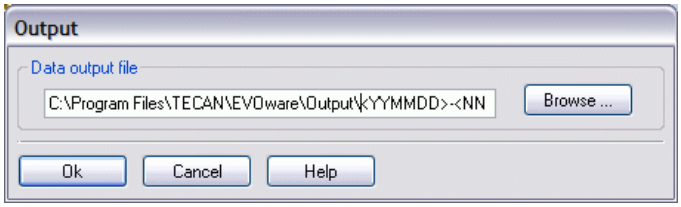

Fig. 16-60 *Specifying the output file of the Safire Reader Measure command*

See 16.42 “Specifying Output Filenames for Reader Data”, 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Measure command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and post-actions

The labware is brought to the *Safire* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.27.5 Safire Reader - Multilabel Command

The Multilabel command performs up to four consecutive measurement steps on the same labware using external software. The labware does not have to leave the reader in between measurements. Multi labeling allows different components (labelled with different fluorophores) to be detected in one operation.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

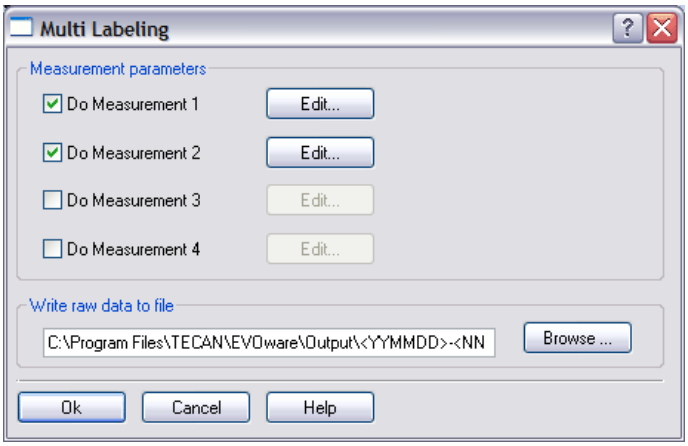

Fig. 16-61 *Safire Reader Multilabel command*

Measurement parameters

For each measurement step you want to perform, check the corresponding checkbox and click **Edit**. The RdrOLE reader interface software then prompts you to specify the measurement parameters. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

Write raw data to file

Enter the path and name of the raw data file or click Browse and choose an existing file. A default file name will be suggested automatically. See 16.42 "Specifying Output Filenames for Reader Data", 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Multilabel command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Safire* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.28 Commands for the Te-Shake Shaker

The Te-Shake Shaker commands are used to control the Tecan orbital shaker for microplates or microplate-like racks. The shaker is used for mixing functions and can be equipped with an optional heating plate. The shaker plate is placed on an eccentric. Rotation of the rotor causes an orbital movement of the shaker plate. The orbit of the movement can be varied by changing the eccentric.

Freedom EVOware is provided with carrier definitions for several different types of Te-Shake shaker. Initially, only one of them is configured for use on the worktable (normally Te-Shake 2Pos).

If you want to use more than one shaker in your script or process or a shaker with more than one rotor, first use the Duplicate Device tool to create additional shaker drivers (see A.9.3 “Duplicate Device Tool”, A-36). A separate driver is needed for each shaker. Then assign the drivers to the shakers you want to use (see 9.5 “Configuring Carriers”, 9-39, “Carrier is device”). The shaker carriers will then appear as icons on the worktable.

Finally, check that the carrier location is correctly assigned for each of the drivers. To do this, start the Configuration Tool, click Device Information, select the respective shaker driver in the Devices list and click Settings. Then click the Driver tab, select the Shaker_Shake command, click Pre-actions and edit the pre-action. Location MoveLocation must specify the carrier location for the shaker which you are configuring. See 8.5.24.1 “Te-Shake Configuration - Driver Tab”, 8-89.

It is also necessary to check the assignment of the carrier location if you are only using one shaker but you have changed the shaker type by unchecking “Carrier is device” for Te-Shake 2Pos and checking it for another shaker type.

You can configure the execution parameters (shaking time etc.) for each of the shakers separately when you add the shaker commands to your script or process.

Note: *Freedom EVOware treats a double shaker (with two rotors) as two separate shakers (labeled Te-Shake Front and Rear in the Control Bar, Labware section). You need two shaker drivers for the double shaker.*

Note: *A multiple site shaker (one rotor but two microplate sites which shake in parallel) is called “Te-Shake 2Pos” in the Control Bar. It only needs one shaker driver.*

16.28.1 Te-Shake shaker - Init Command

The Init command initializes the shaker. You must initialize the hardware with this command before you use the other commands for this device.

This command has no execution parameters or objects, pre-actions or post-actions.

16.28.2 Te-Shake shaker - Shake Command

The Shake command performs the shaking procedure with the specified direction, frequency and temperature.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

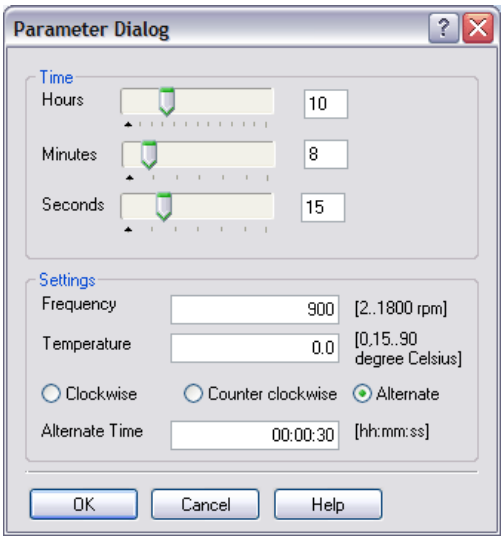

Fig. 16-62 *Te-Shake Shaker Shake command*

Time panel

Hours, minutes, seconds

Specify the required duration of the shaking process.

Settings panel

Frequency

Specify the required shaking frequency (range: 2 to 1800 rpm).

Temperature

Specify the working temperature of the heating plate option (range: 15 to 90 °C). The heating plate cannot cool, so the minimum temperature of the labware is room temperature. Specify 0 to switch off the heating plate (or uncheck the *Heater* checkbox in the device configuration).

Direction of rotation

Select the required direction of shaking. If you choose *Alternate*, you must also specify the time period after which the rotation switches from clockwise to counter clockwise and vice versa.

Note: *Changes in the temperature of the heating plate are not instantaneous. If the shaker is used twice in rapid succession with different temperature settings, the required temperature of the heating plate might not be reached in time and the shaking process will be performed at the wrong temperature. To avoid this, install two shakers which are configured for different temperatures.*

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Shake command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Shaker* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.28.3 Te-Shake shaker - Start Command

The Start command starts the shaking procedure.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

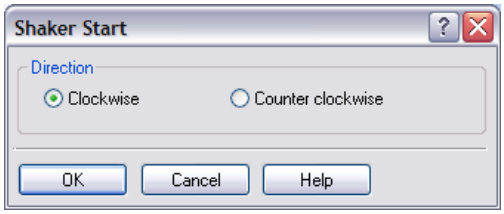

Fig. 16-63 *Te-Shake Shaker Start command*

Direction

Specify whether you want the shaker to shake clockwise or counter clockwise.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.28.4 Te-Shake shaker - Stop Command

The Stop command stops the shaking procedure.
This command has no execution parameters or objects, pre-actions or post-actions.

16.28.5 Te-Shake shaker - SetTemperature Command

The SetTemperature command sets the shaker to the specified temperature. Changes in temperature are not instantaneous. Make sure you specify the SetTemperature command early enough in your process or script to ensure that the shaker has sufficient time to heat up or cool down before using the Shake command.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

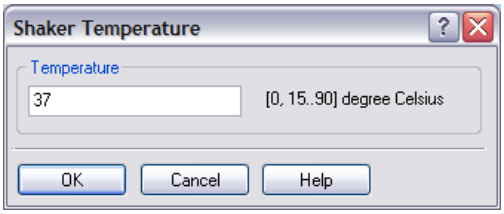

Fig. 16-64 *Te-Shake Shaker SetTemperature command*

Temperature

Specify the working temperature of the heating plate option (15 to 90 °C). The heating plate cannot cool, so the minimum temperature of the labware is room temperature. Specify 0 to switch off the heating plate (or uncheck the *Heater* checkbox in the device configuration).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.28.6 Te-Shake shaker - SetFrequency Command

The SetFrequency command sets the shaking frequency of the shaker.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

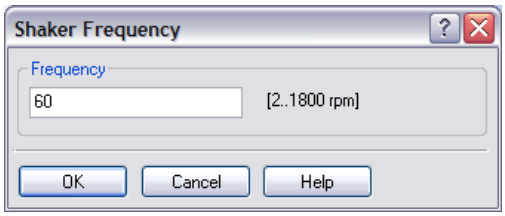

Fig. 16-65 *Te-Shake Shaker SetFrequency command*

Frequency

Specify the required shaking frequency (range: 2 to 1800 rpm).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.29 Commands for the Symbol MS-954 Barcode Scanner

The Symbol LS-954 barcode scanner option allows you to read barcodes on plates or tubes which are presented to the scanner by a plate or tube robot. It can perform several reading attempts and tell the robot to increase its range of motion in front of the laser beam each time to detect barcodes even if they are not precisely positioned in front of the laser beam at the first try.

In Freedom EVOware Plus, the Barcode Scanner - Read Barcode command is an on-the-fly-command – drag the command to the line which connects two process steps (see 5.4.3 “The Process Editor (Freedom EVOware Plus)”, 🗎 5-17).

16.29.1 Symbol MS-954 Barcode Scanner - Read Barcode Command

The Read Barcode command is used to read barcodes from the labware or tube which is presented to the barcode scanner by the RoMa. The RoMa moves the labware or tube in front of the scanner in x, y and z direction according to the driver settings you have made. The scanner driver can be configured to re-scan several times if the labware or tube barcode cannot be read on the first attempt. It increases the distance of movement of the labware or tube along the three axes each time to increase the likelihood of finding the barcode. If a timeout occurs, the user will either be prompted to specify a barcode manually or a default barcode will be constructed, again depending on the driver configuration. See 8.5.25 “Settings for the Symbol MS-954 Barcode Scanner”, 🗎 8-90 for details.

See 13.2.28 “Commands for the Symbol MS-954 Barcode Scanner, Overview”, 🗎 13-29 for general information on using the Read Barcode command.

Freedom EVOware stores each scanned barcode in the internal database in the ID field of the labware record. The barcode information can also be included in report files (see 15.26 “Export Data Command”, 🗎 15-48).

This command has no execution parameters or objects, pre-actions or post-actions.

16.30 Commands for the Spectra Fluor Reader

The Spectra Fluor reader is a fully automatic, computer controlled fluorometer for measuring samples in a microplate. It fulfills the requirements for numerous fluorescence and absorbance applications in research and routine investigations. The filters are arranged in filter slides which allow up to four excitation filters and four emission filters.

The commands for this reader require the RdrOLE and XFluor4 software, which must be installed separately. Freedom EVOware can also control this reader using the Magellan software (see 16.16 “Commands for the Magellan option”, 🗎 16-48).

Note: *The Spectra Fluor commands and the Spectra Fluor driver are also compatible with the Spectra Fluor+ reader.*

16.30.1 Spectra Fluor Reader - Status Command

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 🗎 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.30.2 Spectra Fluor Reader - Excitation Out Command

On some readers, the excitation light source can be filtered with an interference filter. The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.30.3 Spectra Fluor Reader - Emission Out Command

On some readers, the light emission detector of the reader can be filtered with an interference filter. The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.30.4 Spectra Fluor Reader - Open Command

The Open command opens the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.30.5 Spectra Fluor Reader - Close Command

The Close command closes the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.30.6 Spectra Fluor Reader - Measure Command

The Measure command performs a measurement procedure using external software. For a detailed description of the parameters of this command please consult the documentation for RdrOLE and XFluor4.

Execution parameters

The RdrOLE reader interface software prompts you to specify the measurement parameters when you add this command to your script or process. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

After making your entries in the Measurement Parameters dialog box and clicking **Ok**, the Output dialog box is shown where you must specify the name of the

output file for the measurements. Alternatively, click Browse and choose an existing file. A default file name will be suggested automatically:

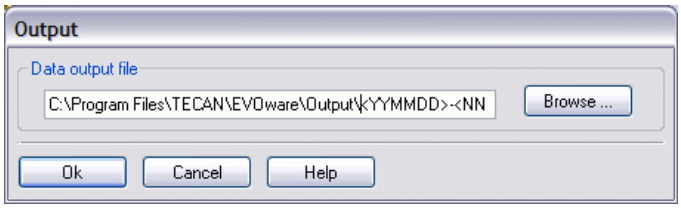

Fig. 16-66 *Specifying the output file of the Spectra Fluor Reader Measure command*

See 16.42 “Specifying Output Filenames for Reader Data”, 16-128 for a description of the placeholders which can be used to generate reader data file names.
To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Measure command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and post-actions

The labware is brought to the *Spectra Fluor* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.30.7 Spectra Fluor Reader - Multilabel Command

The Multilabel command performs up to four consecutive measurement steps on the same labware using external software. The labware does not have to leave the reader in between measurements. Multi labeling allows different components (labelled with different fluorophores) to be detected in one operation.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

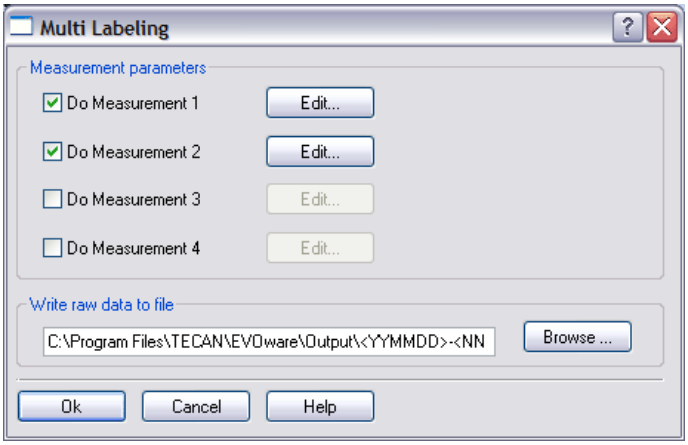

Fig. 16-67 *Spectra Fluor Reader Multilabel command*

Measurement parameters

For each measurement step you want to perform, check the corresponding checkbox and click **Edit**. The RdrOLE reader interface software then prompts you to specify the measurement parameters. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

Write raw data to file

Enter the path and name of the raw data file or click Browse and choose an existing file. A default file name will be suggested automatically. See 16.42 "Specifying Output Filenames for Reader Data", 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Multilabel command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Spectra Fluor* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.31 Commands for the Sunrise Reader

The Sunrise reader is a fully automatic, microplate absorbance reader designed for professional use, enabling the user to measure the light absorbency (optical density) of samples in 96-well microplates. By reading twelve wells simultaneously, the instrument is able to measure a microplate in approximately

six seconds. With an innovative range of options, this versatile MTP reader provides a wide range of features for numerous applications.

The commands for this reader require the RdrOLE and XFluor4 software, which must be installed separately. Freedom EVOware can also control this reader using the Magellan software (see 16.16 “Commands for the Magellan option”, 16-48).

16.31.1 Sunrise Reader - Status Command

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.31.2 Sunrise Reader - Open Command

The Open command opens the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.31.3 Sunrise Reader - Close Command

The Close command closes the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.31.4 Sunrise Reader - Measure Command

The Measure command performs a measurement procedure using external software. For a detailed description of the parameters of this command please consult the documentation for RdrOLE and XFluor4.

Execution parameters

The RdrOLE reader interface software prompts you to specify the measurement parameters when you add this command to your script or process. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware’s offline mode, you must start RdrOLE and choose the reader manually.*

After making your entries in the Measurement Parameters dialog box and clicking **Ok**, the Output dialog box is shown where you must specify the name of the output file for the measurements. Alternatively, click Browse and choose an existing file. A default file name will be suggested automatically:

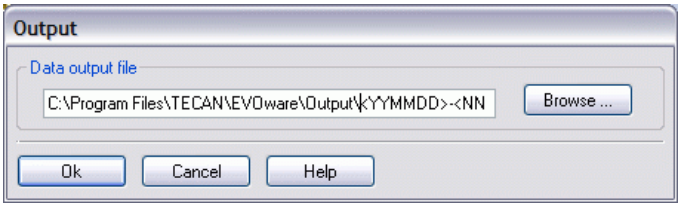

Fig. 16-68 *Specifying the output file of the Sunrise Reader Measure command*

See 16.42 “Specifying Output Filenames for Reader Data”, 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Measure command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and post-actions

The labware is brought to the *Sunrise* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.31.5 Sunrise Reader - Multilabel Command

The Multilabel command performs up to four consecutive measurement steps on the same labware using external software. The labware does not have to leave the reader in between measurements. Multi labeling allows different components (labelled with different fluorophores) to be detected in one operation.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

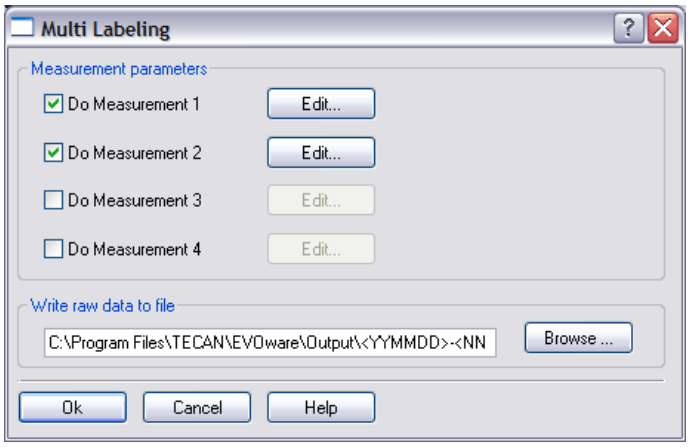

Fig. 16-69 *Sunrise Reader Multilabel command*

Measurement parameters

For each measurement step you want to perform, check the corresponding checkbox and click **Edit**. The RdrOLE reader interface software then prompts you to specify the measurement parameters. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

Write raw data to file

Enter the path and name of the raw data file or click Browse and choose an existing file. A default file name will be suggested automatically. See 16.42 "Specifying Output Filenames for Reader Data", 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Multilabel command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Sunrise* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.32 Commands for the Magnetic Bead Separator

The Magnetic Bead Separator option (also called Te-MagS) is a magnetic bead separator with an optional heating function. It uses a commercially-available liquid containing microscopic magnetic beads to rapidly isolate bio-molecules (e.g. DNA, RNA, proteins etc.) or whole cells from various crude mixtures by means of magnetic forces. The magnetic beads are pulled through the liquid in the tubes using magnets and collect the required substance as they move.

16.32.1 Magnetic Bead Separator - MoveToPosition Command

The MoveToPosition command moves the carrier to one of four positions. You must specify the required position.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

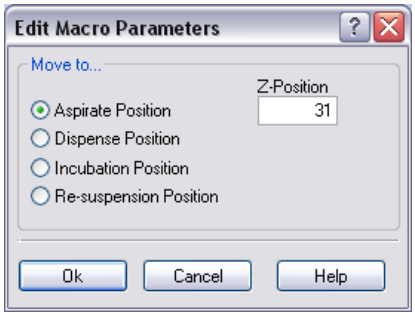

Fig. 16-70 *Magnetic Bead Separation MoveToPosition command*

Specify the position the carrier should be moved to. The four positions are:

Aspirate Position

Carrier above the magnet block, magnet block raised.

Dispense Position

Carrier above the magnet block, magnet block lowered.

Incubation Position

Carrier above the heating block, heating block raised.

Re-suspension Position

Carrier above the heating block, heating block lowered. Use this position to carry out re-suspension by mixing the liquid with the pipetting tips (e.g. with the LiHa - Mix script command).

Z-Position

Specify the required Z-position (height) of the magnet block for the Aspirate position (range: 1 to 31 movement steps).

z = 31 is the highest possible position. z = 1 is the lowest possible position and corresponds to the Dispense position. For more information on this feature see *Z-position* in 16.32.4 “Magnetic Bead Separator - Execution Command”, 16-102.

This field is only shown if you have checked *Support Z-positioning* in the configuration of the Te-MagS driver. This feature requires special Te-MagS hardware. This parameter can only be specified for the Aspirate position.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.32.2 Magnetic Bead Separator - ActivateHeater Command

The ActivateHeater command is used to switch on the heater. You must specify the required temperature. Due to the time required to heat up the heating block, you should specify this command at an early stage in your script or process to ensure that the instrument does not have to wait if you want to heat the samples during the separation process.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

Fig. 16-71 *Magnetic Bead Separation ActivateHeater command*

Specify the working temperature of the heating block (range: 15 to 80 °C). The heating block cannot cool, so the minimum temperature of the labware is room temperature. Specify 0 to switch off the heating block, use the DeactivateHeater command or uncheck the *Heater* checkbox in the device configuration.

Note: *Changes in the temperature of the heating block are not instantaneous.*

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.32.3 Magnetic Bead Separator - DeactivateHeater Command

The DeactivateHeater command is used to switch off the heater when you no longer want to use it. If you do not specify a Deactivate heater command in your script or process, the heater will be switched off automatically when you quit Freedom EVOware. The heater can also be switched off by unchecking the *Heater* checkbox in the device configuration.

This command has no execution parameters or objects, pre-actions or post-actions.

16.32.4 Magnetic Bead Separator - Execution Command

The Execution command is used to specify the sequence of operations to be carried out by the Magnetic Bead Separator (Te-MagS) during the magnetic separation process. The sequence of operations is called a “separation script”.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

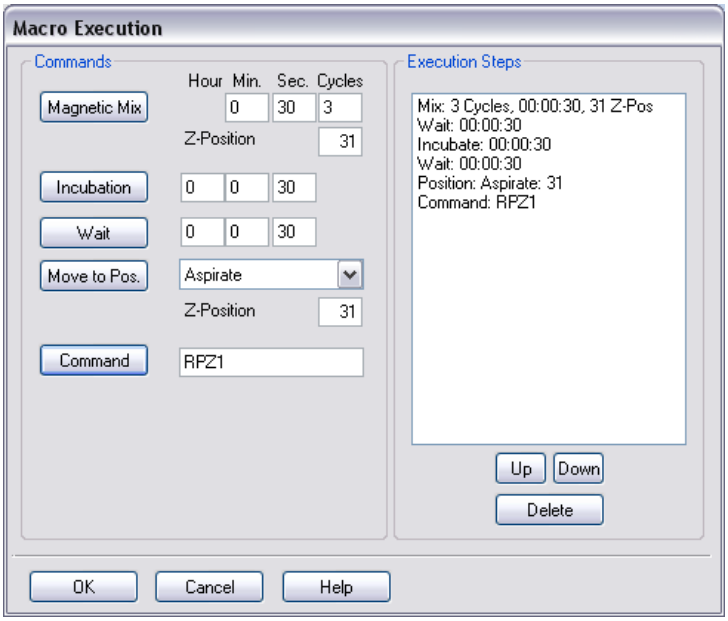

Fig. 16-72 *Magnetic Bead Separation Execution command*

To add a command to the separation script, click one of the *Commands* buttons after specifying the command parameters to the right of the button. To change the order of execution of the commands, select a command from the list and click the **Up** or **Down** buttons. To delete a command from the list, select the command and click **Delete**.

The following commands are available:

Magnetic Mix

This command mixes the magnetic beads with the sample liquid by applying the magnet block to alternate sides of the carrier the specified number of times (*Cycles*) with the specified waiting time at each of the two positions. In addition to moving from left to right and back, the magnet block also moves up and down to follow an approximately rectangular path.

Z-Position

Specify the required Z-position (highest position) of the magnet block for the Magnetic Mix command (range: 1 to 31 movement steps).

z = 31 is the highest possible position and results in the maximum up and down movement of the magnet block during the Magnetic Mix command. z = 1 is the lowest possible position and corresponds to the Dispense position. In this case, the Magnetic Mix command will only move the magnet block from left to right and back and not up and down.

Specify a smaller value for Z-position if you only have a small volume of liquid in the labware. This ensures that the upwards movement of the magnet block will not drag the magnetic beads above the liquid surface. This makes it easier to aspirate the supernatant or wash liquid with the LiHa in a following step.

This field is only shown if you have checked *Support Z-positioning* in the configuration of the Te-MagS driver. This feature requires special Te-MagS hardware.

Incubation

This command incubates the labware on the heater for the specified time.

Wait

This command causes the device to wait for the specified time without performing any actions.

Move to Pos.

This command moves the carrier to one of four positions. The four positions are:

Aspirate Position: Carrier above the magnet block, magnet block raised.

Dispense Position: Carrier above the magnet block, magnet block lowered.

Incubation Position: Carrier above the heating block, heating block raised.

Re-suspension Position: Carrier above the heating block, heating block lowered. Use this position to carry out re-suspension by mixing the liquid with the pipetting tips (e.g. with the LiHa - Mix script command).

Z-Position

Specify the required Z-position (height) of the magnet block for the Aspirate position (range: 1 to 31 movement steps).

z = 31 is the highest possible position. z = 1 is the lowest possible position and corresponds to the Dispense position.

This field is only shown if you have checked *Support Z-positioning* in the configuration of the Te-MagS driver. This feature requires special Te-MagS hardware. This parameter can only be specified for the Aspirate position.

Command

Sends a firmware command to the Te-MagS. Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Execution command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Te-MagS* location with a RoMa MoveObject command and brought back to its *Base* location with another RoMa MoveObject command.

16.33 Commands for the Te-Stack Te-MO

The Te-Stack is used to store a stack of microplates, tube racks or DITI racks and to present them to the instrument for pipetting operations. It fetches the labware from the stacker tower (or “cartridge”) and moves them to a special position where they can be accessed by the liquid handling arm or robot manipulator (RoMa). The Te-Stack can be fitted with a barcode scanner which can read barcode labels on plates when they are inserted or removed. The Te-Stack is fitted to the side of the pipetting instrument alongside the worktable. It can also be fitted above the Te-MO. The barcode scanner option is not available in this case.

The Te-Stack normally has two towers, each of which can hold up to 50 microplates (depending on microplate height). When you fetch the labware, the Te-Stack brings it from the specified tower to the Te-Stack transfer position, where it can be picked up by the RoMa. To return the labware, the RoMa places it on the Te-Stack transfer position and the Te-Stack moves it back into the specified tower. Both towers share the same transfer position. A moveable carrier (the “shuttle” or “slide”) is used to move the labware between the transfer position and the two towers.

To increase the available storage capacity, Freedom EVOware can group several physical Te-Stack devices into one logical Te-Stack device (see 8.5.28.3 “Te-Stack and Te-Stack Te-MO Configuration - Towers Tab”, 8-98).

The Te-Stack can also be fitted above the Te-MO. The Te-Stack Te-MO can only put plates on the front two sites of each of the three Te-MO slides (it does not need a plate robot or slide to do this). For mechanical reasons, the rear three Te-MO sites are not accessible to the stacker. The barcode scanner option is not available for the Te-Stack Te-MO. The Te-Stack Te-MO cannot pick up Te-MO troughs or Te-MO Wash & Refill centers.

16.33.1 Te-Stack Te-MO - InitStacker Command

The InitStacker command initializes the Te-Stack Te-MO. You must initialize the hardware with this command before you use the other commands for this device.

This command has no execution parameters or objects, pre-actions or post-actions.

16.33.2 Te-Stack Te-MO - MoveObject Command

The MoveObject command moves the labware to a site on one of the Te-MO slides.

This command is mainly intended for special applications; it is not normally used as a process step.

Objects

The Te-Stack MoveObject command operates on an object of type *Object* or a derived type with default name *MP*. It moves the object to a *Location* with default name *MoveLocation*.

16.33.3 Te-Stack Te-MO - DropPlate Command

The DropPlate command gets the labware from the specified Te-Stack tower and puts in on the specified Te-MO site.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

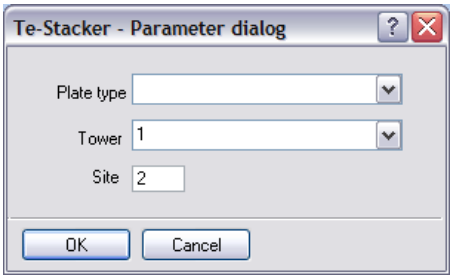

Fig. 16-73 *Te-Stack Te-MO - DropPlate command*

Plate type

Choose the labware type that you want to use with this command. This tells the stacker the labware dimensions and how to handle the labware correctly.

Tower

Choose the stacker tower which contains the labware you want.

Site

Specify the Te-MO site where you want to put the labware. You should only select the front two rows of each slide. The Te-Stack Te-MO is only designed to handle plates and DITI racks - do not specify sites with other types of labware.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.33.4 Te-Stack Te-MO - GetPlate Command

The GetPlate command gets the labware from the specified Te-MO site and returns it to the specified Te-Stack tower.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

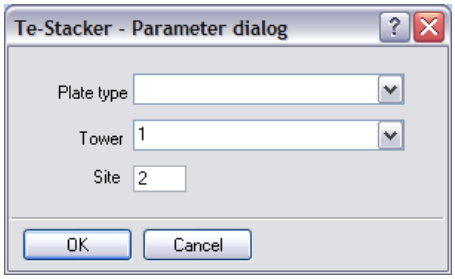

Fig. 16-74 *Te-Stack Te-MO - GetPlate command*

Plate type

Choose the labware type that you want to use with this command. This tells the stacker the labware dimensions and how to handle the labware correctly.

Tower

Choose the stacker tower where you want to return the labware.

Site

Specify the Te-MO site which contains the labware you want. You should only select the front two rows of each slide. The Te-Stack Te-MO is only designed to handle plates and DITI racks - do not specify sites with other types of labware.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.34 Commands for the Te-Stack

The Te-Stack is used to store a stack of microplates, tube racks or DITI racks and to present them to the instrument for pipetting operations. It fetches the labware from the stacker tower (or “cartridge”) and moves them to a special position where they can be accessed by the liquid handling arm or robot manipulator (RoMa). The Te-Stack can be fitted with a barcode scanner which can read barcode labels on plates when they are inserted or removed. The Te-Stack is fitted to the side of the pipetting instrument alongside the worktable. It can also be fitted above the Te-MO. The barcode scanner option is not available in this case.

The Te-Stack normally has two towers, each of which can hold up to 50 microplates (depending on microplate height). When you fetch the labware, the Te-Stack brings it from the specified tower to the Te-Stack transfer position, where it can be picked up by the RoMa. To return the labware, the RoMa places it on the Te-Stack transfer position and the Te-Stack moves it back into the specified tower. Both towers share the same transfer position. A moveable carrier (the “shuttle” or “slide”) is used to move the labware between the transfer position and the two towers.

To increase the available storage capacity, Freedom EVOware can group several physical Te-Stack devices into one logical Te-Stack device (see 8.5.28.3 “Te-Stack and Te-Stack Te-MO Configuration - Towers Tab”, 8-98).

The Te-Stack can also be fitted above the Te-MO. The Te-Stack Te-MO can only put plates on the front two sites of each of the three Te-MO slides (it does not need a plate robot or slide to do this). For mechanical reasons, the rear three Te-MO sites are not accessible to the stacker. The barcode scanner option is not

available for the Te-Stack Te-MO. The Te-Stack Te-MO cannot pick up Te-MO troughs or Te-MO Wash & Refill centers.

Note: *The same driver is used for the Te-Stack Te-MO (see 16.33 "Commands for the Te-Stack Te-MO", 16-105).*

16.34.1 Te-Stack - InitStacker Command

The InitStacker command initializes the Te-Stack. You must initialize the hardware with this command before you use the other commands for this device.
This command has no execution parameters or objects, pre-actions or post-actions.

16.34.2 Te-Stack - MoveObject Command

The MoveObject command moves the labware to the Te-Stack transfer position.
This command is mainly intended for special applications; it is not normally used as a process step.

Objects

The Te-Stack MoveObject command operates on an object of type *Object* or a derived type with default name *MP*. It moves the object to a *Location* with default name *MoveLocation*.

16.34.3 Te-Stack - ReturnPlate Command

The ReturnPlate command returns the labware from the Te-Stack transfer position to the specified tower.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

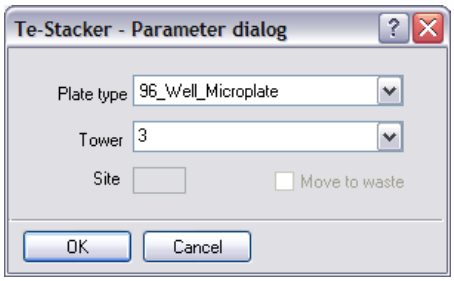

Fig. 16-75 *Te-Stack ReturnPlate command*

Plate type
Choose the labware type that you want to use with this command. This tells the stacker the labware dimensions and how to handle the labware correctly.

Tower
Choose the stacker tower where you want to return the labware.

Site

This field is not relevant for the Te-Stack. It is only used by the Te-Stack Te-MO.

Move to waste

Check this checkbox if you want the Te-Stack to discard the labware which you return to the Te-Stack to the waste instead of putting it back in the tower.

This checkbox is only available if the Te-Stack is fitted with the Waste option. The Waste option for the Te-Stack is mainly intended for discarding empty DITI racks. Freedom EVOware detects this hardware option automatically by interrogating the device.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.34.4 Te-Stack - PrepareReturnPlate Command

The PrepareReturnPlate command moves the Te-Stack shuttle to the Te-Stack transfer position, e.g. to wait for the RoMa to bring the labware. After the RoMa has brought the labware, the ReturnPlate command can then be used to return the labware to the specified stacker tower.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

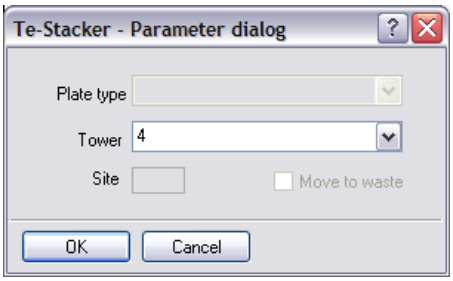

Fig. 16-76 *Te-Stack PrepareReturnPlate command*

Tower

Choose the stacker tower. If you have configured a logical Te-Stack with more than one slide, the Tower parameter indicates which transfer position you want to use (see 8.5.28.3 “Te-Stack and Te-Stack Te-MO Configuration - Towers Tab”, 8-98).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.34.5 Te-Stack - PresentPlate Command

The PresentPlate command gets labware from the specified tower and brings it to the Te-Stack transfer position, where the robot can pick it up and move it away.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

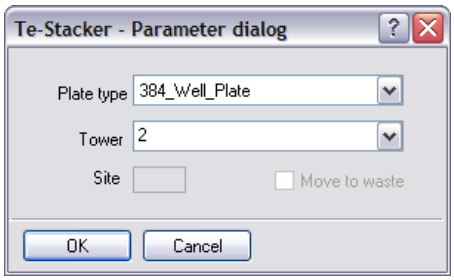

Fig. 16-77 *Te-Stack PresentPlate command*

Plate type

Choose the labware type that you want to use with this command. This tells the stacker the labware dimensions and how to handle the labware correctly.

Tower

Choose the stacker tower which contains the labware you want.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.35 Commands for the Te-VacS

The Te-VacS is an SPE (Solid Phase Extraction) vacuum filtration system which is used for vacuum separation of biological molecules and chemical compounds.
For more information on the Te-VacS see 8.5.29.2 “Te-VacS Configuration - Settings Tab”, 8-106.

16.35.1 Te-VacS - SetPressureDiff Command

The SetPressureDiff command starts the vacuum pump. You must specify the required vacuum. The vacuum is not applied to either of the SPE blocks and the script or process does not wait for the vacuum to build up. Due to the time needed to build up the vacuum, you should specify this command at an earlier stage in your script to ensure that the instrument does not have to wait when you want to apply the vacuum with the ApplyVacuumRear or ApplyVacuumFront commands.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

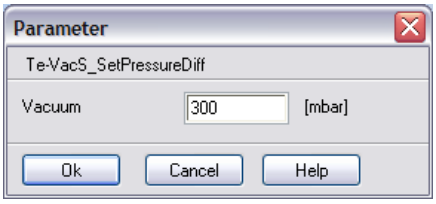

Fig. 16-78 *Te-VacS - SetPressureDiff command*

Vacuum

Specify the required vacuum (range: 30 – 700 mBar).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.35.2 Te-VacS - ApplyVacuumRear Command

The ApplyVacuumRear command opens a valve which applies the vacuum to the rear SPE block (i.e. the SPE block which is connected to vacuum pipe 2). You must specify the required vacuum. If you did not specify a previous SetPressureDiff command, the vacuum pump is then started and pumps the entire vacuum path (“soft pumping”, see Te-VacS operating manual). The vacuum will be applied until a subsequent VentRear command is executed.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

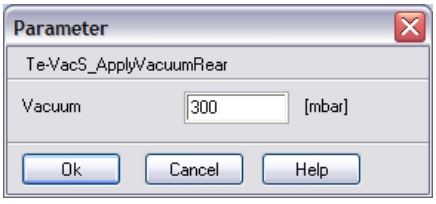

Fig. 16-79 *Te-VacS - ApplyVacuumRear command*

Vacuum

Specify the required vacuum (range: 30 – 700 mBar).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.35.3 Te-VacS - ApplyVacuumFront Command

The ApplyVacuumFront command opens a valve which applies the vacuum to the front SPE block (i.e. the SPE block which is connected to vacuum pipe 1). You must specify the required vacuum. If you did not specify a previous SetPressureDiff command, the vacuum pump is then started and pumps the entire vacuum path (“soft pumping”, see Te-VacS operating manual). The vacuum will be applied until a subsequent VentFront command is executed.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

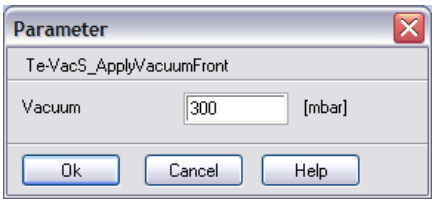

Fig. 16-80 *Te-VacS - ApplyVacuumFront command*

Vacuum

Specify the required vacuum (range: 30 – 700 mBar).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.35.4 Te-VacS - VentRear Command

The VentRear command vents the vacuum from the rear SPE block. It is used to stop the vacuum separation process.

16.35.5 Te-VacS - VentFront Command

The VentFront command vents the vacuum from the front SPE block. It is used to stop the vacuum separation process.

16.35.6 Te-VacS - DeactivateSystem Command

The DeactivateSystem command is used to shut down the Te-VacS when you no longer want to use it in your script or process. It switches off the vacuum pump and vents all blocks and the vacuum tank. If you do not specify a DeactivateSystem command, the Te-VacS will be deactivated automatically when you quit Freedom EVOware.

16.35.7 Te-VacS - CheckWasteLevel Command

The CheckWasteLevel command is used to check the liquid level in the waste bottle. The waste level is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

16.35.8 Te-VacS - CheckPlateWithBlock Command

If labware is positioned on the vacuum block and the vacuum block is moved with the RoMa, the CheckPlateWithBlock command is used to inform Freedom EVOware that the labware has moved too.

This command is normally used as a pre-action and/or post-action of another command. It is not normally used as a process step.

16.35.9 Te-VacS - Filtration Command

The Filtration command, which is only available in Freedom EVOware Plus, is used to specify the sequence of operations to be carried out by the Te-VacS during the vacuum separation process. Three of the tabs are used to make general settings. The fourth tab is used to specify the filtration parameters.

To carry out vacuum separation in Freedom EVOware Standard you must use a combination of the commands SetPressureDiff, ApplyVacuumRear, ApplyVacuumFront, VentRear, VentFront, PositionPlateRear, PositionPlateFront and OpenDesaltingValve. The Filtration command in Freedom EVOware Plus is a high-level command which combines all of these functions.

When setting up your worktable for the Filtration command, you must assign the labware labels FiltrationPlate and CollectionPlate to the filtration plate and the collection plate (see 11.7.1 “Assigning a Label (Name) to the Labware”, 11-19).

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

16.35.9.1 General Tab

This tab is used to make general settings.

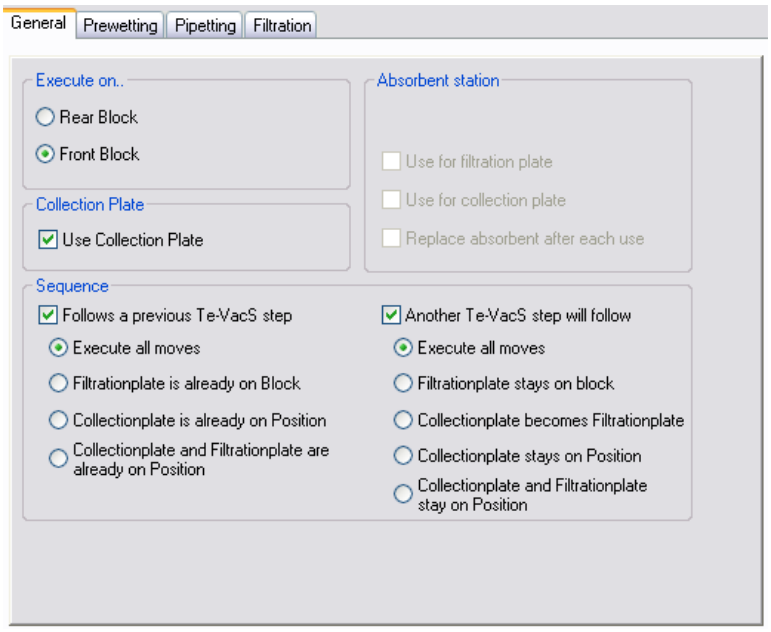

Fig. 16-81 *Te-VacS Filtration command - General tab*

Execute on panel

Specify whether you want to use the front SPE block or the rear SPE block.

Collection plate panel

Use collection plate

Check this checkbox if you want to use a collection plate. A collection plate is used to collect the liquid which is extracted from the filtration plate.

Absorbent station panel

The absorbent station uses a blotting pad to remove drops of liquid from the bottom of the filtration and/or collection plate after each filtration step. It usually consists of a stand or carrier that contains a piece of fabric or absorbent material. It can also be programmed to be a replaceable item. The filtration or collection plate is put on to the absorbent station using the RoMa.

The settings in this panel are only available if you have specified a location for the absorbent station in the device configuration (see 8.5.29.3 “Te-VacS Configuration - Command Generation Tab”, 8-107).

Use for filtration plate

Check this checkbox if you want to blot the filtration plate on the absorbent station.

Use for collection plate

Check this checkbox if you want to blot the collection plate on the absorbent station. This option is only available if you are using a collection plate.

Replace absorbent after each use

Check this checkbox if you want to replace the absorbent station each time it is used. The necessary replacement intervals depend on your application or experiment.

Sequence panel

The sequence panel is used to configure the sequence of plate robot (RoMa) movements if the Te-VacS process step follows and/or precedes another Te-VacS process step. In this case, some of the RoMa movements can be omitted because the labware item(s) have been left at the required position by the preceding step and/or can be left at the required position for the following step.

Freedom EVOware Plus

If your Freedom EVOware Plus process has several Te-VacS process steps which are not directly connected, you must reserve the Te-VacS in the Process Editor (see 11.5.8.1 “Reserving and Linking Devices”, 11-14). If you don’t make a reservation and the Te-VacS is used by several processes, the Te-VacS vacuum block and the plates may not be positioned as expected.

Follows a previous Te-VacS step

Check this checkbox if the Te-VacS process step follows a previous Te-VacS process step.

Execute all moves

Carry out all of the RoMa movements which are normally required by this step.

Filtration plate is already on block

The filtration plate is already on the vacuum block. The associated RoMa movement is not necessary.

Collection plate is already on position

The collection plate is already at the correct position. The associated RoMa movement is not necessary.

Collection plate and filtration plate are already on position
The collection and filtration plates are already at the correct positions. The associated RoMa movements are not necessary.

Another Te-VacS step will follow
Check this checkbox if the Te-VacS process step will be followed by another Te-VacS process step.

Execute all moves
Carry out all of the RoMa movements which are normally required by this step.

Filtration plate stays on block
The filtration plate can be left on the vacuum block at the end of the step. The associated RoMa movement is not necessary.

Collection plate becomes filtration plate
The collection plate will be used as the filtration plate in the following Te-VacS step.

Collection plate stays on position
The collection plate can be left at the same position for the following Te-VacS step. The associated RoMa movement is not necessary.

Collection plate and filtration plate stay on position
The collection and filtration plates can be left at the same positions for the following Te-VacS step. The associated RoMa movements are not necessary.

16.35.9.2 Prewetting Tab

This tab is used to specify optional prewetting of the collection plate.

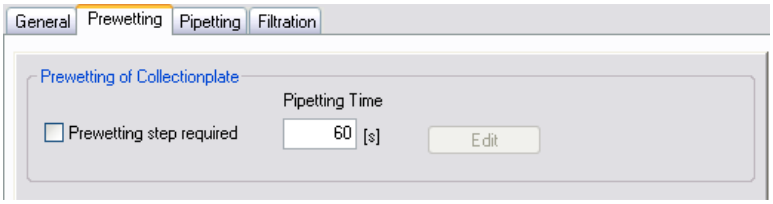

Fig. 16-82 *Te-VacS Filtration command - Pre-wetting tab*

Pre-wetting of collection plate panel

Pre-wetting step required
Check this checkbox if you want to pre-wet the collection plate before the filtration plate is put on top of it. This opens the Script Editor to allow you to create a script for pre-wetting.

Pipetting time
Specify the expected execution time of the pipetting operation.

Edit button
If you have already specified a pre-wetting script for the Filtration command, click this button to edit the script.

16.35.9.3 Pipetting Tab

This tab is used to specify optional pipetting to the filtration plate.

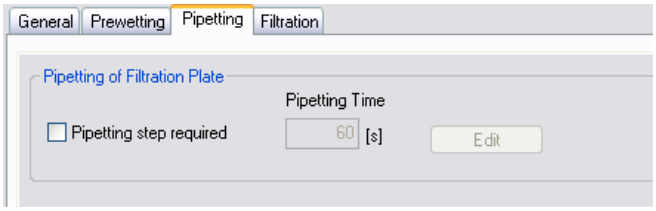

Fig. 16-83 *Te-VacS Filtration command - Pipetting tab*

Pipetting of filtration plate panel

Pipetting step required

Check this checkbox if you want to pipette to the filtration plate before filtration starts. This opens the Script Editor to allow you to create a script for pipetting.

Pipetting time

Specify the expected execution time of the pipetting operation.

Edit button

If you have already specified a pipetting script for the Filtration command, click this button to edit the script.

16.35.9.4 Filtration Tab

This tab is used to specify the separation script for the vacuum separation process.

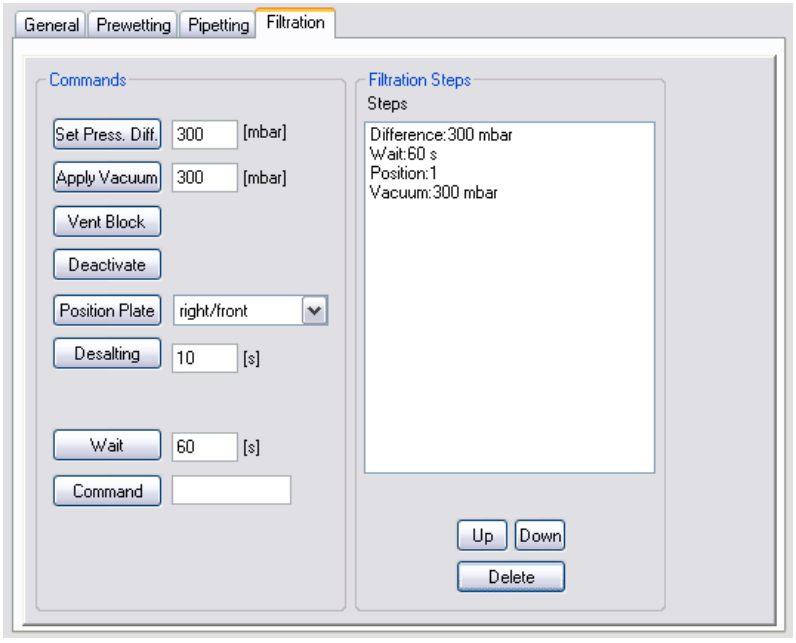

Fig. 16-84 *Te-VacS Filtration command - Filtration tab*

To add a command to the separation script, click one of the *Commands* buttons after specifying the command parameters to the right of the button. To change the order of execution of the commands, select a command from the list and click the **Up** or **Down** buttons. To delete a command from the list, select the command and click **Delete**.

The following commands are available

Set Pressure Difference

This command starts the vacuum pump. You must specify the required vacuum (range: 30 – 700 mBar). This does not apply vacuum to either of the SPE blocks. If you want to use the fast pumping procedure (see Operating Manual, Te-VacS), you should use this command in advance of the Apply Vacuum command. Due to the time needed to build up the vacuum, you should follow this command with a Wait command.

Apply Vacuum

This command applies the vacuum to the SPE block specified on the General tab. You must specify the required vacuum (range: 30 – 700 mBar). The vacuum will be applied until a subsequent Vent Block command is executed.

The vacuum builds up slowly unless you precede this command with a Set Pressure Difference command. This is equivalent to the soft pumping procedure (see Operating Manual, Te-VacS - see 1.2.1 “Related Documentation and Software”, 1-3).

Vent Block

This command vents the vacuum from the SPE block specified on the General tab. It is used to stop the vacuum separation process.

Deactivate

This command is used to shut down the Te-VacS when you no longer want to use it in your script or process. It switches off the vacuum pump and vents all blocks and the internal vacuum container. If you do not specify a Deactivate command, the Te-VacS will be deactivated automatically when you quit Freedom EVOware.

Position plate

This command is only relevant if the Te-VacS is fitted with the Repositioner option. It moves the collection plate for the rear vacuum block into one of four positions before you apply the vacuum. For more information on this feature, see 16.35.10 “Te-VacS - PositionPlateRear Command”, 16-118.

Desalting

This command opens the desalter valve to drain the residues. It is only relevant for Te-VacS versions which are equipped with a desalter valve. Specify how long you want to open the desalting valve (range: 1 - 60 seconds).

Wait

This causes the separation script to wait for the specified duration.

Command

Sends a firmware command to the Te-VacS. Refer to the firmware documentation for the device for a complete list of firmware commands (see also 1.2.1 “Related Documentation and Software”, 1-3).

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

16.35.10 Te-VacS - PositionPlateRear Command

The PositionPlateRear command is only relevant if the Te-VacS is fitted with the Repositioner option. This option allows the contents of four subsequent 96-well SPE plates (e.g. TecPrep 96 microplates) to be extracted to one 384-well collection plate (e.g. a MALDI target). The collection plate is placed on a movable carrier.

The PositionPlateRear command moves the collection plate for the rear vacuum block into one of four positions before you apply the vacuum. After extracting liquid from one of the 96-well microplates, it is replaced by another microplate and the collection plate is moved by 4.5 mm in the X and/or Y direction to the new position.

The collection plate can be moved to the following positions:

- left/rear
- left/front
- right/rear
- right/front.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

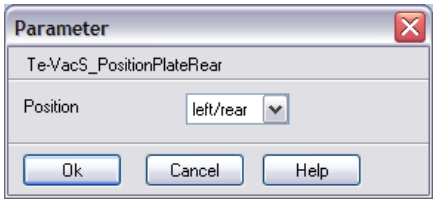

Fig. 16-85 *Te-VacS - PositionPlateRear command*

Position

Choose the required position of the collection plate.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.35.11 Te-VacS - PositionPlateFront Command

The PositionPlateFront command is only relevant if the Te-VacS is fitted with the Repositioner option. This option allows the contents of four subsequent 96-well SPE plates (e.g. TecPrep 96 microplates) to be extracted to one 384-well collection plate (e.g. a MALDI target). The collection plate is placed on a movable carrier.

The PositionPlateFront command moves the collection plate for the front vacuum block into one of four positions before you apply the vacuum. After extracting liquid from one of the 96-well microplates, it is replaced by another plate and the collection plate is moved by 4.5 mm in the X and/or Y direction to the new position.

The collection plate can be moved to the following positions:

- left/rear
- left/front
- right/rear

- right/front.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

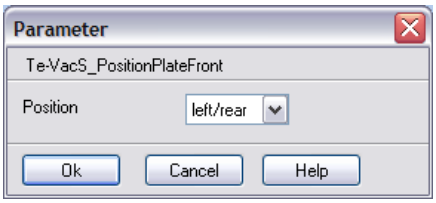

Fig. 16-86 *Te-VacS - PositionPlateFront command*

Position

Choose the required position of the collection plate.

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.35.12 Te-VacS - OpenDesaltingValve Command

The OpenDesaltingValve command opens the desalter valve to drain the residues. It is only relevant for Te-VacS versions which are equipped with a desalter valve.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

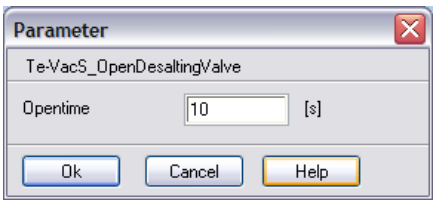

Fig. 16-87 *Te-VacS - OpenDesaltingValve command*

Open time

Specify how long you want to open the desalting valve (range: 1 - 60 seconds).

To view or edit the execution parameters again later, right-click on the script command in the Script Editor and choose Edit in the context menu.

16.36 Commands for the Te-MO

The Te-MO is a robot pipetting device which can be attached to the worktable of the pipetting instrument. It is equipped with a specially designed pipetting system

which can pipette to up to 384 wells simultaneously, resulting in an extremely high throughput and efficiency. See 15.56 “Te-MO Commands”, 🗎 15-121 for more information.

16.36.1 Te-MO - Init Command

The Init command initializes the Te-MO. You must initialize the hardware with this command before you use the other commands for this device.

This command has no execution parameters or objects, pre-actions or post-actions.

16.36.2 Te-MO - Pipette Command

The Pipette command is used to create a pipetting script for the Te-MO. When you drag it to the Process Editor, it opens the Script Editor. See 11.4.2 “Creating a Pipetting Script”, 🗎 11-5.

If you want to use this command, make sure that you have set the I/O Status for the Te-MO to ON in the Configuration Tool.

16.37 Commands for the Ultra Reader

The Tecan Ultra reader is a fully automated software-controlled fluorometer for both normal and polarized fluorescence as well as absorbance measurements. It provides unrivaled performance in luminescence mode.

The commands for this reader require the RdrOLE and XFluor4 software, which must be installed separately. Freedom EVOware can also control this reader using the Magellan software (see 16.16 “Commands for the Magellan option”, 🗎 16-48).

16.37.1 Ultra Reader - Status Command

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 🗎 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.37.2 Ultra Reader - Excitation Out Command

On some readers, the excitation light source can be filtered with an interference filter. The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.37.3 Ultra Reader - Emission Out Command

On some readers, the light emission detector of the reader can be filtered with an interference filter. The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.37.4 Ultra Reader - Open Command

The Open command opens the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.37.5 Ultra Reader - Close Command

The Close command closes the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.37.6 Ultra Reader - Measure Command

The Measure command performs a measurement procedure using external software. For a detailed description of the parameters of this command please consult the documentation for RdrOLE and XFluor4.

Execution parameters

The RdrOLE reader interface software prompts you to specify the measurement parameters when you add this command to your script or process. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

After making your entries in the Measurement Parameters dialog box and clicking **Ok**, the Output dialog box is shown where you must specify the name of the output file for the measurements. Alternatively, click Browse and choose an existing file. A default file name will be suggested automatically:

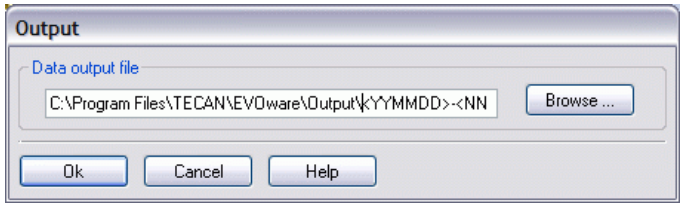

Fig. 16-88 *Specifying the output file of the Ultra Reader Measure command*

See 16.42 “Specifying Output Filenames for Reader Data”, 16-128 for a description of the placeholders which can be used to generate reader data file names.
To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Measure command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and post-actions

The labware is brought to the *Ultra* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.37.7 Ultra Reader - Multilabel Command

The Multilabel command performs up to four consecutive measurement steps on the same labware using external software. The labware does not have to leave the reader in between measurements. Multi labeling allows different components (labelled with different fluorophores) to be detected in one operation.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

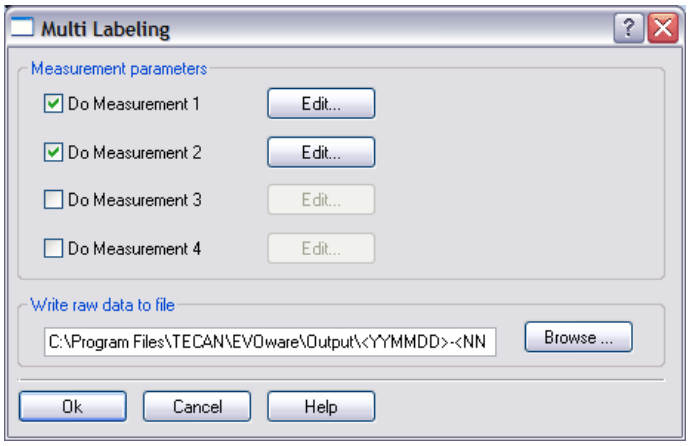

Fig. 16-89 *Ultra Reader Multilabel command*

Measurement parameters

For each measurement step you want to perform, check the corresponding checkbox and click **Edit**. The RdrOLE reader interface software then prompts you to specify the measurement parameters. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware’s offline mode, you must start RdrOLE and choose the reader manually.*

Write raw data to file

Enter the path and name of the raw data file or click Browse and choose an existing file. A default file name will be suggested automatically. See 16.42 “Specifying Output Filenames for Reader Data”, 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Multilabel command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Ultra* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.38 Commands for the Ultra Evolution Reader

The Tecan Ultra Evolution is a multi-functional microplate reader which provides high performance for the vast majority of today’s microplate applications and research. Being sensitive while fast, the Ultra Evolution fulfills the special demands of Ultra High Throughput Screening (UHTS). It provides the following measurement techniques: Fluorescence Intensity (FI), Fluorescence Time Resolved (FTR), Fluorescence Polarization (FP), Fluorescence Lifetime (FL), Absorbance, Luminescence and Dual Color Luminescence (Bioluminescence Resonance Energy Transfer). Measurement results can be optimized for different assay types (cell based or homogeneous), for different microplate types and for different dispensed volumes per well.

The commands for this reader require the RdrOLE and XFluor4 software, which must be installed separately. Freedom EVOware can also control this reader using the Magellan software (see 16.16 “Commands for the Magellan option”, 16-48).

16.38.1 Ultra Evolution Reader - Status Command

The Status command interrogates the status of the reader. The device status is reported during process runtime in the Messages/Error window of the runtime controller (see 12.2.4 “Runtime Controller, Extended View (Running a Process)”, 12-14).

This command has no execution parameters or objects, pre-actions or post-actions.

16.38.2 Ultra Evolution Reader - Excitation Out Command

On some readers, the excitation light source can be filtered with an interference filter. The Excitation Out command moves the excitation filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.38.3 Ultra Evolution Reader - Emission Out Command

On some readers, the light emission detector of the reader can be filtered with an interference filter. The Emission Out command moves the emission filter slide out of the reader to allow the filters to be removed or exchanged.

After removing, inserting or exchanging the filter, the slide should be pushed back in to the reader manually.

This command has no execution parameters or objects, pre-actions or post-actions.

16.38.4 Ultra Evolution Reader - Open Command

The Open command opens the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.38.5 Ultra Evolution Reader - Close Command

The Close command closes the door of the reader.

This command has no execution parameters or objects, pre-actions or post-actions.

16.38.6 Ultra Evolution Reader - Measure Command

The Measure command performs a measurement procedure using external software. For a detailed description of the parameters of this command please consult the documentation for RdrOLE and XFluor4.

Execution parameters

The RdrOLE reader interface software prompts you to specify the measurement parameters when you add this command to your script or process. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

After making your entries in the Measurement Parameters dialog box and clicking **Ok**, the Output dialog box is shown where you must specify the name of the

output file for the measurements. Alternatively, click Browse and choose an existing file. A default file name will be suggested automatically:

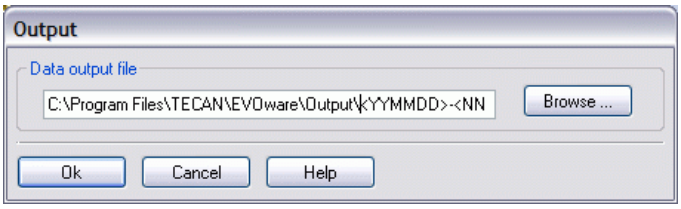

Fig. 16-90 *Specifying the output file of the Ultra Revolution Reader Measure command*

See 16.42 “Specifying Output Filenames for Reader Data”, 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Measure command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and post-actions

The labware is brought to the *Ultra Evolution* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.38.7 Ultra Evolution Reader - Multilabel Command

The Multilabel command performs up to four consecutive measurement steps on the same labware using external software. The labware does not have to leave the reader in between measurements. Multi labeling allows different components (labelled with different fluorophores) to be detected in one operation.

Execution parameters

You are prompted to specify the following execution parameters when you add this command to your script or process:

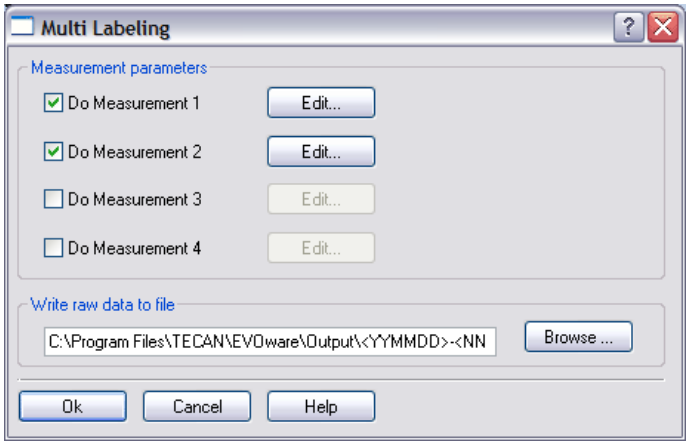

Fig. 16-91 *Ultra Evolution Reader Multilabel command*

Measurement parameters

For each measurement step you want to perform, check the corresponding checkbox and click **Edit**. The RdrOLE reader interface software then prompts you to specify the measurement parameters. Refer to the RdrOLE online help and manual for more information.

Note: *RdrOLE must be configured to connect to the chosen reader. In Freedom EVOware's offline mode, you must start RdrOLE and choose the reader manually.*

Write raw data to file

Enter the path and name of the raw data file or click Browse and choose an existing file. A default file name will be suggested automatically. See 16.42 "Specifying Output Filenames for Reader Data", 16-128 for a description of the placeholders which can be used to generate reader data file names.

To view or edit the execution parameters again later, right-click on the process step in the Process Editor and choose Edit Parameters in the context menu.

Objects

The Multilabel command operates on an object of type *Sample* or a derived type with default name *MP*.

Pre-actions and Post-actions

The labware is brought to the *Ultra Evolution* location with a RoMa MoveObject command and the door of the reader is opened with the Open command. After the measurement, the labware is brought back to its *Base* location with another RoMa MoveObject command and the door is closed with the Close command.

16.39 Commands for the Process Script Driver

The Process Starter device driver starts a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations and/or on the values of variables. Alternatively, you can start a specified process unconditionally.

The Process Starter - Start command can be used as a process step or as a script command in a Process Script process step (see 16.24.1 “Process Starter - Start Command”, 16-78).

The Process Starter and Process Script device drivers are only relevant for Freedom EVOware Plus.

16.39.1 Process Script - Script Command

The Process Starter device driver starts a specified process when a set of user-defined conditions are met. You can specify conditions which are based on database locations and/or on the values of variables. Alternatively, you can start a specified process unconditionally.

The ProcStart - Start command can be used as a process step or as a script command in a Process Script process step (see 16.24.1 “Process Starter - Start Command”, 16-78).

The Process Script - Script command is used to create a script for the Process Starter script commands. When you drag it to the Process Editor, it opens the Script Editor automatically. See 11.4.2 “Creating a Pipetting Script”, 11-5.

16.40 Commands for the Transfer Station

The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, it is used to transfer labware from one RoMa to another. The Transfer command is only available if you have installed Freedom EVOware with two RoMas.

16.40.1 Transfer Station - Transfer Command

The Transfer Station is an unused location on the worktable of the pipetting instrument. If your pipetting instrument is fitted with two RoMa arms, the Transfer command uses the Transfer Station to pass labware from one RoMa to the other if this becomes necessary. Freedom EVOware instructs the first RoMa to put down the labware on the Transfer Station, where the second RoMa can pick it up again.

In most cases, both RoMas can access all locations on the the pipetting instrument. This command is only needed if - for mechanical reasons - labware which has been picked up by one of the RoMas must be moved to a location which is only accessible to the other one. This situation is detected automatically when you preview your process. If the Runtime Controller reports a RoMa access problem, insert the Transfer command between the two relevant process steps. Freedom EVOware then uses the Transfer Station automatically when it is needed.

16.41 Commands for the Te-Link

The Te-Link is a transfer rail (conveyor) option that allows the transport of labware such as microplates from one pipetting instrument to another or to another external device. Labware to be moved is placed by the RoMa on a shuttle carrier

at one end of the Te-Link. It is then moved to the other end of the Te-Link where it can be picked up by another RoMa for further processing.

16.41.1 Te-Link - Move Command

The Te-Link is a transfer rail (conveyor) option that allows the transport of labware such as microplates from one pipetting instrument to another or to another device. The Move command moves the shuttle of the Te-Link from one position on the transfer rail to another:

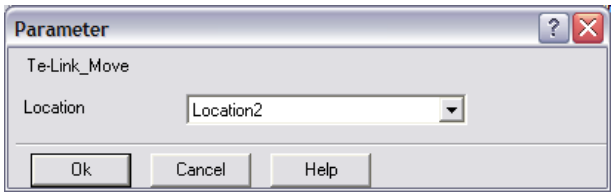

Fig. 16-92 *Te-Link - Move command*

Location

Choose which position you want to move the shuttle to.

Location1 and Location2 are assigned to two physical positions of the Te-Link shuttle (normally the two ends of the Te-Link rail) when setting up the hardware. This is done by sending firmware commands to the device using the *Setup & Service* software.

16.42 Specifying Output Filenames for Reader Data

The Measure commands of microplate readers such as the GENios or Ultra family allow you to specify an output file for the results of the measurement steps. The file name of this file can either be specified explicitly or it can be generated during script or process runtime. The following placeholders are available for generating the file name:

Tab. 16-3 *Filename placeholders for reader data output files*

Placeholder	Example	Description
<YYMMDD>	000912	The current date
<YYYYMMDD>	20000912	The current date
<DDMMYY>	120900	The current date
<DDMMYYYY>	12092000	The current date
<YYMMDD.NNN>	000912.003	The current date and a sequence number (counter)
<YYYYMMDD.NNN>	20000912.003	The current date and a sequence number (counter)
<DDMMYY.NNN>	120900.003	The current date and a sequence number (counter)

Tab. 16-3 Filename placeholders for reader data output files

Placeholder	Example	Description
<DDMMYY-NNN>	120900-003	The current date and a sequence number (counter)
<DDMMYYYY.NNN>	12092000.003	The current date and a sequence number (counter)
<NNN>	003	A sequence number (counter)
<variable_name>	12345	The contents of a variable in the Freedom EVOware database
<ID>	12345	The labware barcode. After scanning the labware with the barcode reader or the PosID, the barcode is stored in this database variable

The placeholders are replaced dynamically with their current values during script or process runtime. You can combine the placeholders with plain text, e.g. to specify the filename extension.

Examples

- Use the following string to generate filenames containing the date and a sequence number (counter):
  <YYMMDD><NNN>.rdr
  (e.g. 0411301234.rdr)
- Use the following string to generate the file name from the labware barcode:
  <ID>.rdr
  (e.g. 783898936.rdr)

17 Special Features, Example Scripts and Processes,

This chapter introduces the example scripts and processes and describes the usage and configuration of special features in Freedom EVOware.

17.1 Using the Automatic DITI Handling feature

If you are using DITIs on the liquid handling arm (LiHa), Freedom EVOware provides special facilities to ensure that sufficient DITIs are present on the worktable for your script or process and to automatically fetch new DITI racks as and when needed.

The automatic DITI handling feature is also compatible with stackable DITI racks. However, this feature is not available for and is not meaningful for the Te-MO and the MCA.

A **stackable DITI rack** is a special DITI rack design which can be stacked using plastic spacers to form a pile of racks. The pile can be put on the workable. This avoids the need for a carousel if the number of DITIs required by your script or process is not too high. The Get DITIs command picks up DITIs from the DITI rack which is on the top of the pile. When the DITI rack is empty, it is removed from the pile together with the spacer to reveal the next DITI rack in the pile. Stackable DITI racks can only be used with the LiHa.

Freedom EVOware is provided with a sample carrier definition for a stackable DITI rack. Since the dimensions of stackable DITI racks are not currently standardized and can vary between models and manufacturers, you must re-teach the coordinates using the actual DITI carrier and labware type which you plan to use.

The automatic DITI handling feature is only intended for automatic replacement of DITIs on the LiHa. It cannot be used to replace DITIs on the MCA, MCA384 or Te-MO.

Proceed as follows to use automatic DITI handling feature:

17.1.1 Automatic DITI handling in Freedom EVOware Standard

In Freedom EVOware Standard, automatic LiHa DITI replacement is done using a DITI replacement script (sub-routine).

Set up the worktable to include DiTi carriers and DiTi labware to meet the requirements of your script. Unless you are using stackable DITI racks, you also need to configure a labware source for the DITI racks (typically a carousel or hotel). Stackable DITI racks are normally put on the worktable.

Add an *Activate DITI Handling* command to your script for each DITI type which is used. The *Activate DITI Handling* command specifies the DITI type and also a DITI replacement script (sub-routine) which replaces the DITI racks when all of the DITIs have been used (see 15.6 “Activate DITI Handling Command”, 15-12).

For **standard DITI racks**, the replacement script is normally programmed using two Transfer Labware commands (one to remove the empty DITI racks and one to get fresh DITI racks). Depending on the application, it can also contain a Set DITI Position command. For **stackable DiTi racks**, the replacement script only needs

to remove the empty DITI racks and the spacers (and thus only needs one Transfer Labware command). Don't remove the last rack of the stack.

The worktable locations (grid, site) of the DITI racks which will need replacing or removing during runtime is specified in the Transfer Labware command(s) of the DITI replacement script using the pre-defined variables Replace_Diti_Grid and Replace_Diti_Site. For each Get DITI command in your pipetting script, Freedom EVOware automatically sets these variables to the correct grid and site for the selected DITI type before executing the command.

Script Runtime

During script runtime, the DITI replacement script is called whenever DITIs need to be replaced. When using stackable DITI racks, the replacement script only needs to remove the empty DiTi racks along with the spacers to reveal the next DITI rack in the pile. Note: stackable DITI racks and spacers cannot be stacked when they are empty, you must discard them to a suitable location.

Note: *The used DITIs are discarded to the DITI waste which is specified in the Drop DITIs command(s).*

Before running the script

For **standard DITI racks**: Make sure that the source of DITI racks (e.g. carousel or hotel) contains full DITI racks.

For **stackable DITI racks**: Make sure the stack contains enough DITI racks for your script. Provided that you set the DITI position correctly using the Set DITI Position command, the topmost DITI rack in the stack does not need to be full.

For **standard DITI racks** and **stackable DITI racks**: Freedom EVOware remembers the position in the DITI rack where the last DITI was fetched. When starting a new run, the Get DITIs command starts picking up DITIs at the next available position.

17.1.1.1 Example of Automatic DITI handling in Freedom EVOware Standard

The first three lines of the main script are as follows:

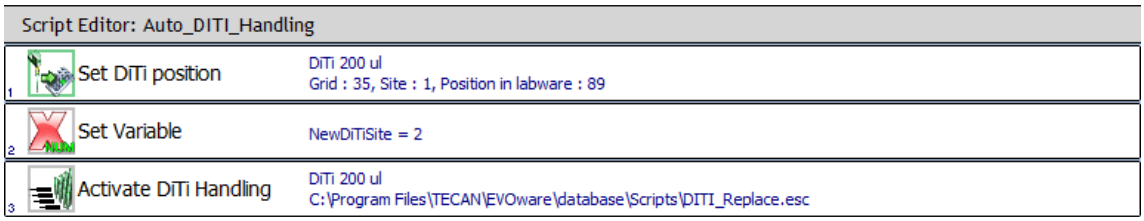

Fig. 17-1 *Automatic DITI handling - Main script*

The variable NewDitiSite, which is declared in line 2, specifies a hotel site which contains the next full DITI rack to be used. The rest of the main script contains pipetting commands, Get DITI and Drop DITI commands etc.

The initial worktable setup in this example is as follows:

A carrier "DITI 2Pos + Waste" is positioned at worktable grid 35:

- Site 1 of this carrier contains a full DITI Rack.
- The first DITI will be taken from position 89 of this DITI rack.

A hotel is positioned at worktable grid 43:

- Hotel site 1 is empty. The DITI rack at grid 35, site 1 will be put here when all of the DITIs have been used for pipetting.
- All other hotel sites contain full DITI racks.
- Hotel site 2 contains a full DITI rack which will be used for the first replace operation.

First replace operation

When all of the DITIs have been used from the DITI rack at grid 35, it will be moved to site 1 of the hotel. A fresh DITI rack will be taken from site 2 of the hotel.
The replace script in this example is as follows:

Script Editor: DITI_Replace
1 Comment
put empty DITI rack in hotel
2 Transfer Labware
Source: Grid 'REPLACE_DITI_GRID,' Site 'REPLACE_DITI_SITE'; Destination: Grid '43', Site 'NewDiTiSite-1'; Narrow (ROMA 1)
3 Comment
get new DITI rack from hotel
4 Transfer Labware
Source: Grid '43,' Site 'NewDiTiSite'; Destination: Grid 'REPLACE_DITI_GRID', Site 'REPLACE_DITI_SITE'; Narrow (ROMA 1)
5 Comment
increment counter for next time
6 Set Variable
NewDiTiSite = NewDiTiSite+1
7 Comment
reset DiTi position to beginning of new DTI rack
8 Set DiTi position
DiTi 200 ul
Grid : 35, Site : 1, First position in labware : 1

Fig. 17-2 *Automatic DITI handling - Replace script*

The replace script is specified in the Activate DITI Handling command in line 3 of the main script.

Second replace operation

When all of the DITIs have been used from the DITI rack at grid 35, it will be moved to site 2 of the hotel. A fresh DITI rack will be taken from site 3 of the hotel.
The replace operations will be repeated until all of the DITIs in the hotel have been used.

17.1.2 Automatic DITI handling in Freedom EVOware Plus

With the process editor open, set up the worktable to include DiTi carriers and DiTi labware to meet the requirements of your process. Unless you are using stackable DITI racks, you also need to configure a labware source for the DITI racks (typically a carousel or hotel). Stackable DITI racks are normally put on the worktable.
Specify the worktable location(s) of the DITI racks which will need replacing during runtime. To do this, right click on the DiTi rack on the worktable and choose *Automatic replace* from the context menu. A tick alongside this context menu item shows that automatic DITI Handling is enabled for this site. Repeat this operation for each DiTi type (DITI rack) which you want to replace automatically.

When using **stackable DiTi racks**, you must choose a special DITI waste location for discarding the empty DITI racks and the spacers. This is because stackable DITI racks and spacers cannot be stacked when they are empty.

To enable the automatic DITI rack waste feature, right click on a DITI waste on the worktable and choose *Waste for DITI racks* from the context menu. A tick alongside this context menu item shows that this location will then be used for the empty DITI racks and spacers. This option is only available for the DITI waste site of a DITI carrier with waste and is only intended for discarding empty DITI racks and spacers.

Note: *The used DITIs are discarded to the DITI waste which is specified in the Drop DITIs command(s).*

There are two approaches to automatic DITI handling in Freedom EVOware Plus:

- **Method A**: The labware source for the DITI racks (e.g. carousel or hotel) is full and there are no DITI racks on the worktable.
- **Method B**: DITI racks are present on the worktable, some of them are only partly full. For this approach, Freedom EVOware needs to have up to date information on the DITI positions of all DITI types used in the process.

17.1.2.1 Process runtime settings for automatic DITI handling

There are two basic approaches to automatic DITI handling in Freedom EVOware Plus:

- **Method A**: The labware source for the DITI racks (e.g. carousel or hotel) is full and there are no DITI racks on the worktable.
- **Method B**: DITI racks are present on the worktable, some of them are only partly full. For this approach, Freedom EVOware needs to have up to date information on the DITI positions of all DITI types used in the process.

Depending on the chosen approach, the following settings should be made in the Runtime Controller of Freedom EVOware Plus:

Method A:

Check the *Start initial load process* checkbox in the Runtime Controller to load the worktable automatically with DITI racks before you start the main process.

In addition:

- Make sure that the source of the DITIs (e.g. carousel) contains full DITI racks at all positions.
- Make sure that there are no DITI racks already on the worktable.
- Freedom EVOware will clear away all used and partly used DITI racks when the process is finished.

Before starting the main process, one Initial Load process will be started for each DiTi type which is configured for automatic handling. When the main process is finished, one clear-away process will be started for all DiTi types which are configured for automatic handling.

Method B:

Do not check the *Start initial load process* checkbox in the Runtime Controller if you want to load the worktable manually with full DITI racks before you start the main process or if you are carrying on from a previous process which used DITIs.

In addition:

- For each DITI type on the worktable, Freedom EVOware remembers the position in the DITI Rack of the last DITI which was fetched. This information is still available even if you restart Freedom EVOware or your

PC. If you have made manual changes to the DITI racks in the meantime, for example by replacing empty racks on the worktable with full ones, you must use the direct command Set DITI Position to inform Freedom EVOware of the current situation.

– For each DITI type used in the process, make sure there is at least one empty position in the DITI rack source (e.g. carousel or hotel). This position will be used for empty DITI racks during the replacement operation. Note: The empty DITI racks are returned to the carousel or hotel before getting the full DITI racks.
– Partly used DITI labware will be left on the worktable when the process is finished. If you then want to run another process, do not check the *Start Initial DiTi Load Processes* checkbox in the follow-up process.

17.2 Script and process recovery function

Freedom EVOware provides functions for script and process error recovery. This allows aborted pipetting scripts and processes to be restarted where they were stopped.

Freedom EVOware Standard: When the script is open in the Script Editor (or you open the same script again) the Run button in the Freedom EVOware toolbar changes to Recover. In addition, the last script line which was successfully executed is highlighted in orange.

Freedom EVOware Plus: The Process Recovery Wizard takes you directly to the Runtime Controller; the Run button in the Runtime Controller changes to Recover.

Script or process recovery is still available if you have restarted your PC and/or Freedom EVOware in the meantime.

When you recover a script, information on barcodes which were previously scanned is no longer available. If barcodes were scanned, make sure that recovery starts at or prior to the barcode scanning operation. When you recover a process, information on barcodes which were scanned is stored in the internal database and does not get lost.

17.2.1 Script Recovery Function

When running a pipetting script, Freedom EVOware monitors the progress and stores information on the current line number, the current values of the variables which are used, etc. If the script was stopped while it was running and did not execute completely, for example due to a runtime error or because you clicked Stop, you are given the option of running the script at the point where it was interrupted.

If the script is open in the Script Editor (or you open the same script again), the **Run** button in the Freedom EVOware toolbar changes to **Recover**. In addition, the last script line which was successfully executed is highlighted in orange.

Click the Recover button to start the Recovery Wizard if you want to continue the interrupted script. Choose Run instead from the pull-down list in the toolbar if you want to run the entire script again.

Note: *If required, you can edit the script to make some changes or corrections before you click Recover.*

The following dialog box is shown if you click the Recover button:

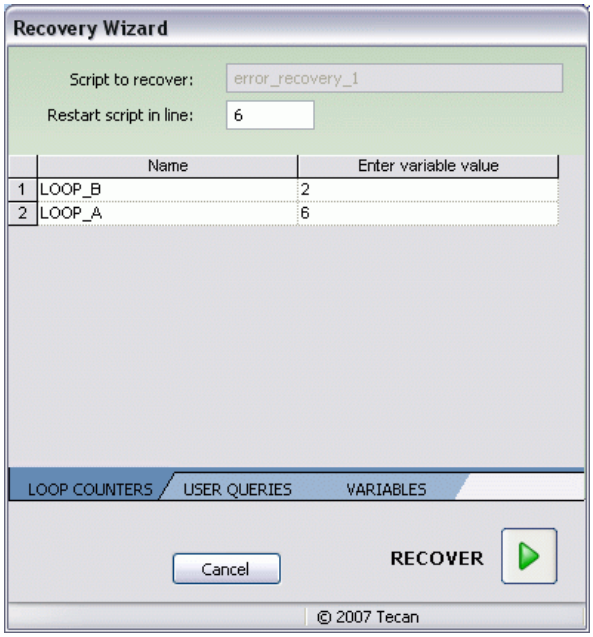

Fig. 17-3 *Recovery Wizard for Scripts - Loop counters tab*

The three tabs of the above dialog box lists the loop counters, variables queried during runtime with an operator prompt (via the Set Variable command with the option *User Query at Script Start)* and other script variables and shows the values which were current when the script was interrupted.
The following figure shows an example of the Variables tab:

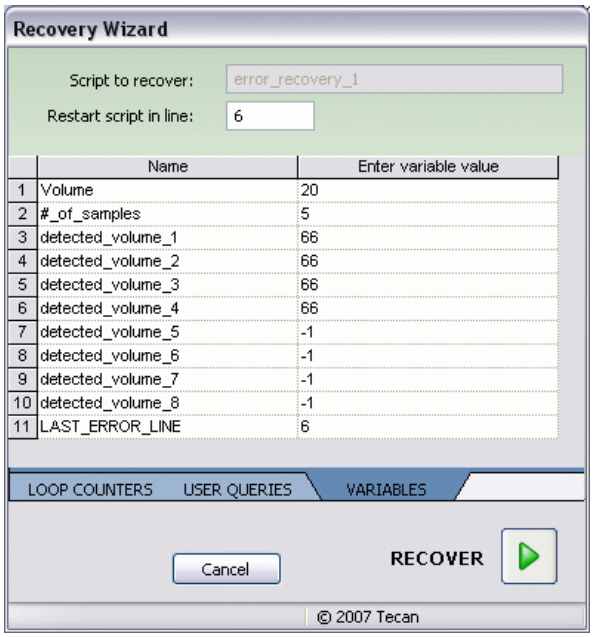

Fig. 17-4 *Recovery Wizard for scripts - Variables tab*

Restart script in line

Specify the line number of the script command where you want to resume running. Alternatively, In the Script Editor, click the line where you want to resume running the script before you click the Recover button.

If the script uses a worklist and you specify the line number of the Execute Worklist command, a new dialog box is shown where you can make settings for recovering the execution of the worklist. See 17.2.1.1 “Recovery Wizard for Worklists”, 17-7.

Then adjust the values of the loop counters and variables in the above dialog box to appropriate values (if necessary) and click *Recover* to continue executing the script. For example, if you want to completely repeat a program loop which was interrupted, you should adjust the loop counters correspondingly.

Note: *Clicking the required line in the Script Editor or choosing a line number in the above dialog box does not roll back the values of the variables and loop counters automatically. You must specify the required values of the loop counters and variables manually in the dialog box.*

Click Recover after you have made the required settings. Freedom EVOware will then re-initialize the pipetting instrument, run the script in offline mode until the specified line has been reached and then switch to real mode before continuing.

Note: *If the script was stopped while incubation was taking place, the incubation times will be lengthened by the time that the script was stopped.*

In order to choose appropriate values for the variables and loop counters, you need to know how the script functions.

The script recovery function can recover scripts which use synchronous sub-routines but cannot recover scripts which use asynchronous sub-routines (see 15.49 “Sub-Routine Command”, 15-113). The script recovery feature is only available for Freedom EVOware Standard.

17.2.1.1 Recovery Wizard for Worklists

When running a pipetting script, Freedom EVOware monitors the progress and stores information on the current line number, the current values of the variables which are used, etc. If the script was stopped while it was running and did not execute completely, for example due to a runtime error or because you clicked Stop, you are given the option of running the script at the point where it was interrupted.

If the script is open in the Script Editor (or you open the same script again), the **Run** button in the Freedom EVOware toolbar changes to **Recover**. In addition, the last script line which was successfully executed is highlighted in orange.

Click the Recover button to start the Recovery Wizard if you want to continue the interrupted script (see 17.2.1 “Script Recovery Function”, 17-5). Choose Run instead from the pull-down list in the toolbar if you want to run the entire script again.

If the script uses a worklist and you specify the line number of the Execute Worklist command in the Recovery Wizard, when you click Recover Freedom EVOware will then show the Worklist Recovery Wizard:

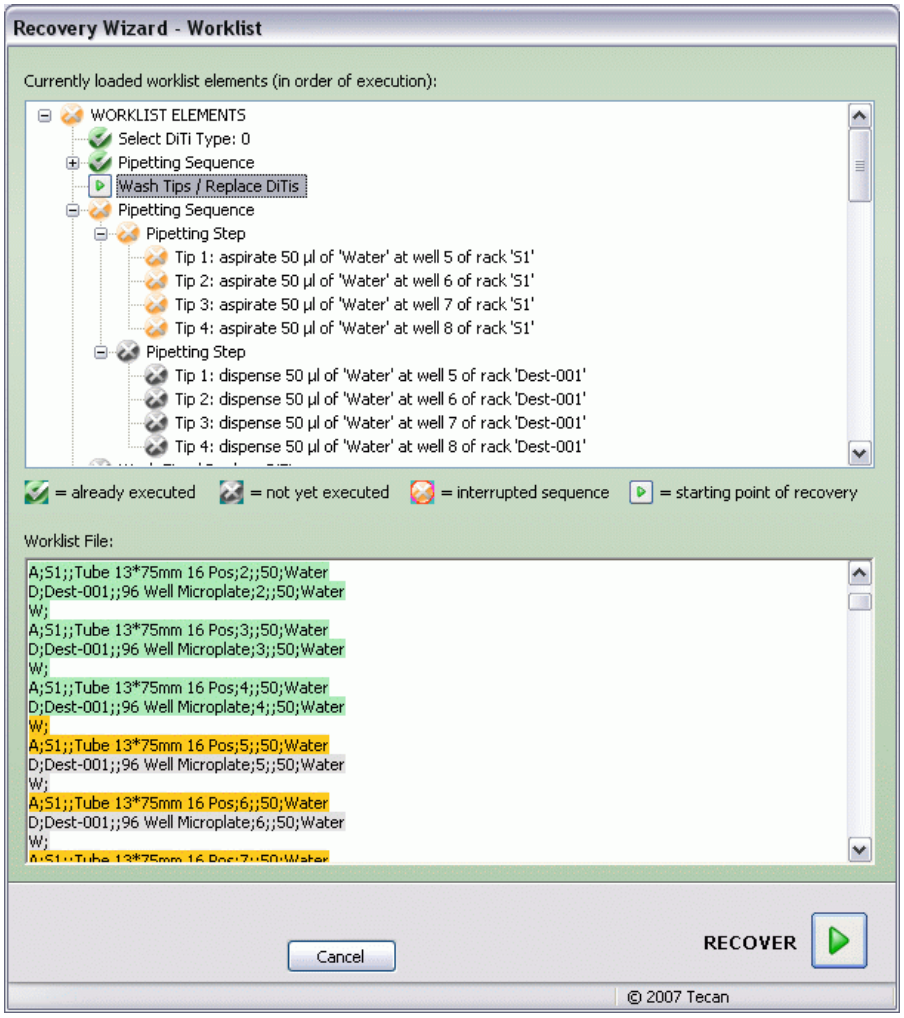
Recovery Wizard - Worklist
Currently loaded worklist elements (in order of execution):
WORKLIST ELEMENTS
Select DiTi Type: 0
Pipetting Sequence
Wash Tips / Replace DiTis
Pipetting Sequence
Pipetting Step
Tip 1: aspirate 50 µl of 'Water' at well 5 of rack 'S1'
Tip 2: aspirate 50 µl of 'Water' at well 6 of rack 'S1'
Tip 3: aspirate 50 µl of 'Water' at well 7 of rack 'S1'
Tip 4: aspirate 50 µl of 'Water' at well 8 of rack 'S1'
Pipetting Step
Tip 1: dispense 50 µl of 'Water' at well 5 of rack 'Dest-001'
Tip 2: dispense 50 µl of 'Water' at well 6 of rack 'Dest-001'
Tip 3: dispense 50 µl of 'Water' at well 7 of rack 'Dest-001'
Tip 4: dispense 50 µl of 'Water' at well 8 of rack 'Dest-001'
= already executed
= not yet executed
= interrupted sequence
= starting point of recovery
Worklist File:
A;S1;;Tube 13*75mm 16 Pos;2;;50;Water
D;Dest-001;;96 Well Microplate;2;;50;Water
W;
A;S1;;Tube 13*75mm 16 Pos;3;;50;Water
D;Dest-001;;96 Well Microplate;3;;50;Water
W;
A;S1;;Tube 13*75mm 16 Pos;4;;50;Water
D;Dest-001;;96 Well Microplate;4;;50;Water
W;
A;S1;;Tube 13*75mm 16 Pos;5;;50;Water
D;Dest-001;;96 Well Microplate;5;;50;Water
W;
A;S1;;Tube 13*75mm 16 Pos;6;;50;Water
D;Dest-001;;96 Well Microplate;6;;50;Water
W;
Cancel
RECOVER
© 2007 Tecan

Fig. 17-5 *Worklist Recovery Wizard*

The Worklist Recovery Wizard visualizes the currently loaded worklist in two different views:

- The tree view at the top lists all of the operations in the worklist in their order of execution. Click “+” to expand the view to get more details of the operation.
- The view at the bottom lists the lines (records) of the worklist file (GWL file).

Both views use colors to indicate the progress of execution (green = already executed, orange = operation was interrupted, grey = not yet executed).

The two views are synchronized - if you select an entry in the tree view, this scrolls the worklist file view to the corresponding line, and vice versa.

How to proceed

Choose the worklist operation/line where you want to resume running. In the top view, the selected line is shown as a small square button containing a green arrow.

Click Recover when you have made your choice. Freedom EVOware will then re-initialize the pipetting instrument, run the script in offline mode until the choosen worklist line has been reached and then switch to real mode before continuing.

Note: *The worklist recovery feature is only available for Freedom EVOware Standard.*

17.2.2 Process Recovery Function

When running processes or methods, Freedom EVOware monitors the progresses and stores information on the process instances, the current values of the variables which are used, etc. If a process (or set of processes) was stopped while it was running and did not execute completely, for example due to a runtime error or because you clicked Stop, you are given the option of running the process (or processes) at the point where it was (they were) interrupted.

To recover the process, click the Recover button which is now shown in the Runtime Controller to start the Process Recovery Wizard (see 17.2.2.2 “Process Recovery Wizard, Recovery Settings”, 17-10).

Alternatively, click Cancel if you want to restart Freedom EVOware before recovering the process. This may be necessary e.g. if a mechanical or labware problem has occurred which you need to rectify before continuing the process. The following dialog box is shown if you click Cancel:

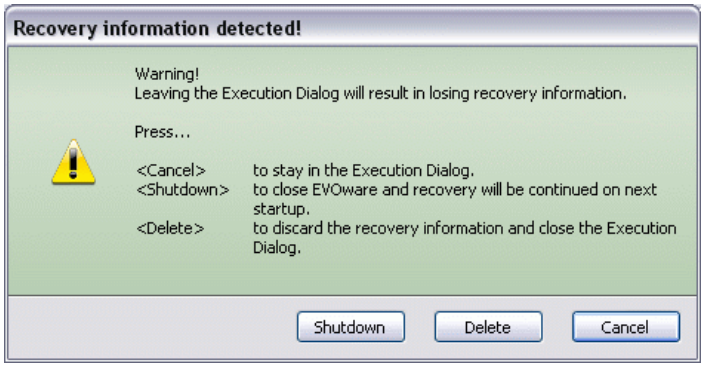
Recovery information detected!
Warning!
Leaving the Execution Dialog will result in losing recovery information.
Press...
<Cancel> to stay in the Execution Dialog.
<Shutdown> to close EVOware and recovery will be continued on next startup.
<Delete> to discard the recovery information and close the Execution Dialog.
Shutdown
Delete
Cancel

Fig. 17-6 *Error recovery warning*

Shutdown

Close Freedom EVOware. You can then carry out recovery when you restart Freedom EVOware.

Cancel

Return to the Runtime Controller. Use this option if the process was paused and you clicked Cancel in the Runtime Controller by mistake.

Delete

Ignore the incomplete process, delete the recovery information and return to the Runtime Controller.

17.2.2.1 Process Recovery Wizard

The following dialog box is shown if the last process (or set of processes) that you run was stopped while it was running and did not execute completely and you Freedom EVOware was restarted:

Method / Process Recovery Wizard
The most recently executed method or process was not executed completely.
What do you want to do?
Recover last executed method/process
Proceed to startup screen
Cancel
<<< Back
MAKE YOUR SELECTION
© 2007 Tecan

Fig. 17-7 *Process recovery wizard*

Recover last executed method / process

Go to the Runtime Controller to recover (continue) the incomplete process or processes. In the Runtime Controller, click *Recover* to adjust the recovery settings or click *Continue* to restart and continue the process at the last executed timeslice using the default recovery settings.

Note: *If the process was stopped while incubation was taking place, the incubation times will be lengthened by the time that the process was stopped.*

Proceed to startup screen

Ignore the incomplete process, delete the recovery information and go to the Startup Wizard.

17.2.2.2 Process Recovery Wizard, Recovery Settings

The following dialog box is shown if the last process that you run was interrupted while it was running and did not execute completely and you clicked *Recover* in the Runtime Controller or you chose *Recover last executed method / process* in the Process Recovery Wizard dialog box:

Concerning the positions of the labware following an interruption to the process: Before continuing the process it is important to ensure that the physical position of the labware on the worktable of the pipetting instrument matches the position information in the Freedom EVOware database (the “database location”). The procedure to follow is described below.

Modify Labware tab

This tab is used to edit labware attributes and/or to move labware to a new database location before continuing with recovery:

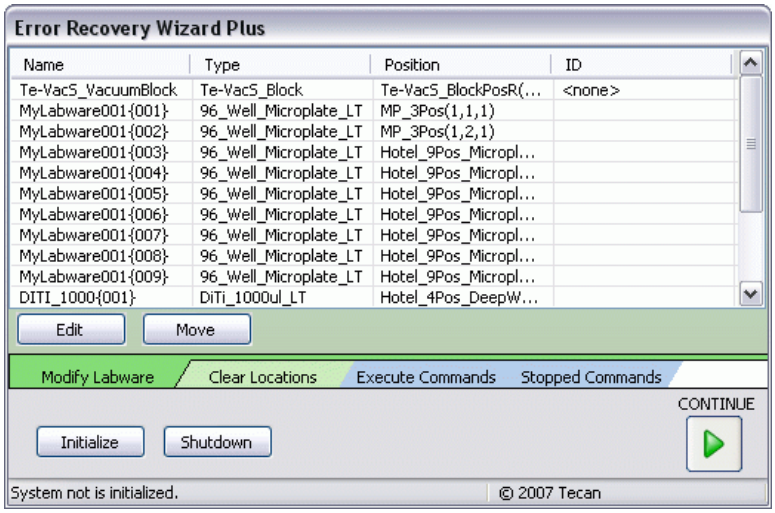

Fig. 17-8 *Process recovery wizard - Modify Labware tab*

Click Edit to edit the attributes of the selected labware item. Click Move to change the position information for the labware in the database (the “database location”). This is necessary if the current physical position of the labware does not match the database location, e.g. due to a mechanical malfunction or because you moved the labware manually to a new position while the process was stopped.

See 9.4.8 “Labware Attributes”, 9-34 for information on labware attributes.

Clear Locations tab

This tab is used to clear database locations which refer to faulty labware. Remove the faulty labware from the worktable of the pipetting instrument manually and click *Clear Selected Location* to tell Freedom EVOware that the database location is no longer occupied. The position information in the database for the labware is then updated to <base position>. This is important above all for locations which are needed for other labware when you continue the process.

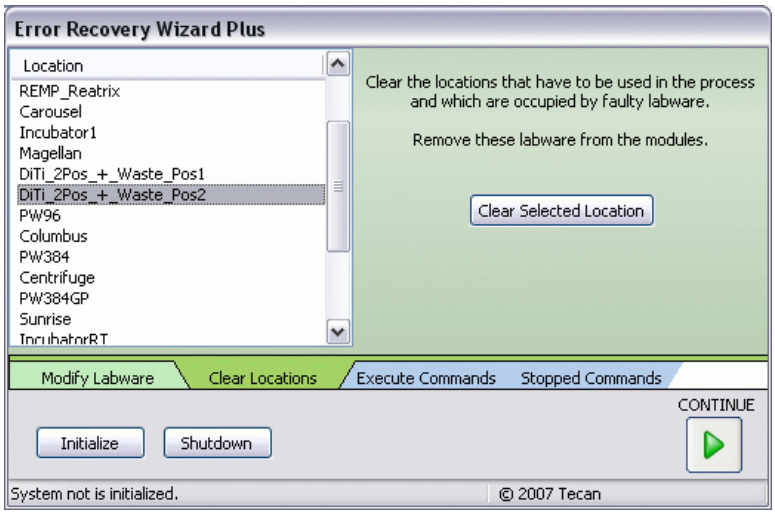

Fig. 17-9 *Process recovery wizard - Clear Locations tab*

Execute Commands tab

This tab is used to execute device commands manually before continuing with recovery. For example, click Direct Command, choose Drop DITIs and click Execute to drop the DITIs.

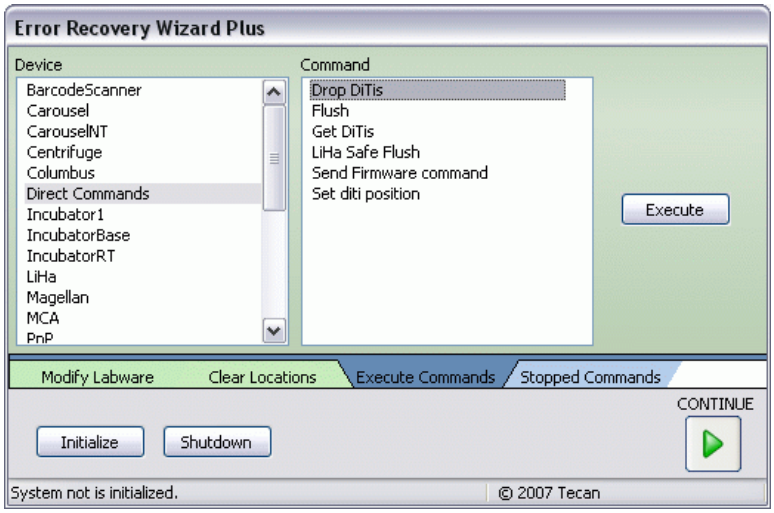

Fig. 17-10 *Process recovery wizard - Execute Commands tab*

Stopped Commands tab

This tab shows the last commands which were executed before the process stopped. The scheduler assumes that the commands in the list were completely correctly before the process stopped. If an inspection of the pipetting instrument shows that a command did not execute properly, choose the incomplete command and click Execute:

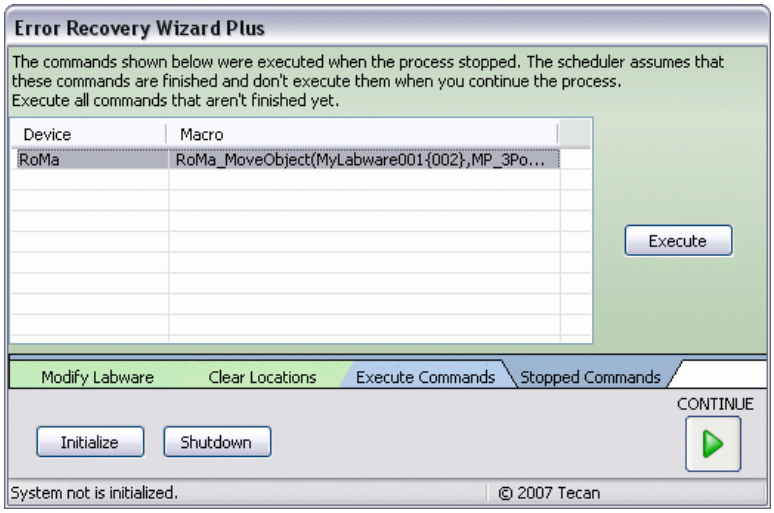

Fig. 17-11 *Process recovery wizard - Stopped Commands tab*

Concerning incomplete movement commands (RoMa commands): if labware was not moved to the correct position when the process stopped, you can either choose the RoMa command in the list and click Execute to move the labware with the RoMa or ignore the incomplete RoMa command and put the labware manually

at the correct position before you continue with recovery. In the latter case, you must update the database location accordingly with the Modify Labware tab.
Click *Continue* to recover (finish running) the process when you have made all of the required settings.

17.3 Site-specific RoMa vectors

Site-specific RoMa vectors are needed e.g. for special carrier types with different physical characteristics for different sites (e.g. site 1 is lower than site 2). Site-specific RoMa vectors are also needed for the MP 2Pos carrier if you want to grip the labware on the narrow side. Due to the limited space, labware on the rear site must be gripped from the front (RoMa fingers to the rear) and labware on the front site must be gripped from the rear (RoMa fingers to the front).
Proceed as follows to create a site-specific RoMa vector:

1. In the Robot Vectors section of the Control Bar, right-click Robot Vectors and choose New in the context menu.
2. To assign the RoMa vector to a specific carrier type and site, use the following naming conventions for the new vector:

For gripping the labware on the narrow side:
<CarrierName> Narrow POS<SiteNo> for the Move Narrow vector
<CarrierName> DriveIN Narrow POS<SiteNo> for the Approach Narrow vector

For gripping the labware on the wide side:
<CarrierName> Wide POS<SiteNo> for the Move Wide vector
<CarrierName> DriveIN Wide POS<SiteNo> for the Approach Wide vector

SiteNo is 0-based (specify 0 for site 1).
For example: Hotel 9pos Microplate Narrow POS0.

3. Teach the new vector in the Teach Plate Robot Vector dialog box. If you have specified the carrier name correctly, the Teach Plate Robot Vector dialog box will already show the correct carrier type in the Carrier Name field.

In Freedom EVOware Plus, the new RoMa vector will be used automatically when moving labware to the specified site of this carrier type.
In Freedom EVOware Standard, the name of the RoMa vector is not important (it has no influence on the Transfer Labware and RoMa Vector commands). Despite this, it is a good idea (good practice) to follow the same naming conventions for site-specific vectors in Freedom EVOware Standard, too.
See 9.6.1 “Using RoMa Vectors”, 9-58 for information on the RoMa vector types Move and Approach.
See 15.59 “Transfer Labware Command”, 15-143 for information on using user-defined vectors in Freedom EVOware Standard in the Transfer Labware command. User-defined vectors can also be used in RoMa Vector commands.

17.4 Safe Pathways Feature

With appropriate design of the pipetting script and the correct choice of the liquid classes and airgaps for the pipetting, the risk of contamination due to aerosols or drops of liquid falling when the LiHa moves across labware on the worktable is extremely low.

The safe pathways feature is intended for extremely critical applications such as those which are very sensitive to cross contamination. It allows you to specify safe movement paths for the LiHa to prevent it from moving above certain areas of the labware unless they are directly involved in the pipetting operation.

The safe pathways feature is enabled by specifying values for two carrier attributes for the labware which is involved in the pipetting (see 9.5.5.1 “Labware Carrier Attributes”, 9-49):

- The carrier attribute SafeMoveOffset specifies an X-offset in mm for safe LiHa movement to and from the pipetting position.
- The carrier attribute SafeMoveSpeed specifies the speed to use for movements along the safe paths in mm/s.

Safe pathways are enabled by setting the carrier attribute SafeMoveOffset to a non-zero value. Negative values specify an offset to the left of the pipetting position; positive values specify an offset to the right of the pipetting position.

Safe pathways can be disabled again by setting the carrier attribute SafeMoveOffset to zero.

Note: *To allow you to enable safe pathways for specific scripts and processes only, it is recommended to create copies of the carrier configurations you intend to modify and to specify the two carrier attributes for the copies but not for the original versions.*

Suggested offset for tube racks: If there is enough space on the worktable, allow one unused grid position between adjacent tube racks and set SafeMoveOffset to 25 mm or -25 mm.

Suggested offset for microplates: Set SafeMoveOffset to half the distance between adjacent columns of wells (e.g. 4.5 mm).

The SafeMoveSpeed attribute is optional; if it is not set, the LiHa uses the default speeds when moving along the safe paths.

The following rules are applied to safe pathways:

- If SafeMoveOffset is non-zero for the source carrier (Aspirate step), safe pathways are activated for the pipetting sequence.
- If SafeMoveOffset is zero for the source carrier, normal movements are used, even if SafeMoveOffset is non-zero for the destination carrier.
- For multi-dispense sequences within the same labware, the safe movement is only performed for the first dispense position; there are no safe moves within the labware for the remaining dispense operations.
- When executing multiple Aspirate steps or an Aspirate-Dispense sequence within the same labware, the LiHa moves out along the safe path after the first step and uses the same path to move in again for the next step.
- If safe pathways are used for the pipetting sequence and you are using DITIs, the subsequent DiTi discard operation also uses a safe movement as follows:
  - The LiHa moves in the Y direction to behind the worktable and then in the X direction along the back of the worktable to the grid position of the DITI waste. It then moves forward to the DITI waste and discards the DITIs. It then moves back to the original pipetting position by retracing the same path.

The safe movements are carried out as follows:
After an Aspirate command:

1 If the tips are currently lower than the specified z-Travel height for the labware, they are raised to that height.
2 The LiHa moves with the safe movement speed along the X-axis by the offset defined for the carrier.
3 The LiHa moves with the safe movement speed along the Y-axis to the rear of the worktable and raises the tips to maximum height (to avoid a collision with the PosID-3, if fitted).

Before a Dispense command:

1 The LiHa moves at normal speed along the rear of the worktable to the position “dispense position + SafeMoveOffset” for the destination carrier.
2 The tips are lowered to the lowest z-Travel height which clears all obstacles within the destination carrier.
3 The LiHa moves with the safe movement speed along the Y-axis to the pipetting position.
4 The LiHa moves with the safe movement speed along the X-axis by the negative SafeMoveOffset distance to reach the actual pipetting position.

In the following example:

- The red line shows the default movement of the LiHa.
- The green dotted line shows the LiHa movement with the safe pathways feature enabled.

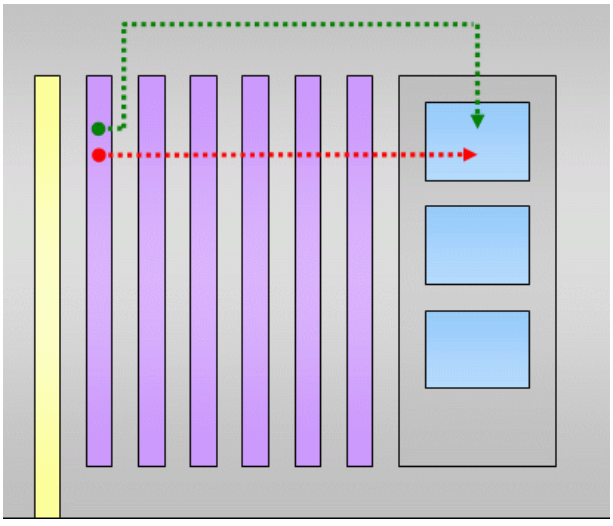

Fig. 17-12 *Safe pathways feature*

17.5 Columbus Washer - Washing a Variable Number of Strips in the Plate

In Freedom EVOware Plus, the Columbus - WashPlate command can be configured to wash a variable number of strips (columns or rows) of the labware.

This is done by assigning a non-zero value to one of the two following special attributes of the labware you want to wash:

- The labware attribute *StripCount* is used to wash a specified number of strips, starting at strip 1. Specify 0 to wash all of the strips.
  With the default wash head configuration of the Columbus Washer, microplates are washed in portrait orientation (there are 12 strips with 8 wells per strip; strip 1 is towards the rear of the washer).
- The labware attribute *StripMask* is used to wash a specified mixture of strips. The required strips are specified as a bit-mapped value:

  1 = Strip 1
  2 = Strip 2
  4 = Strip 3
  ...
  5 = Strip 1 and Strip 3
  0 = Wash all of the strips

Proceed as follows:

- Activate either or both of the above special attributes for the labware (Edit Labware > Advanced tab > Click Attributes > Click Add). See 9.4.8 “Labware Attributes”, 9-34.
- Assign a value to either StripCount or StripMask as required using the Set Variable command. The Set Variable command is needed twice, the first Set Variable command initializes the special attribute:

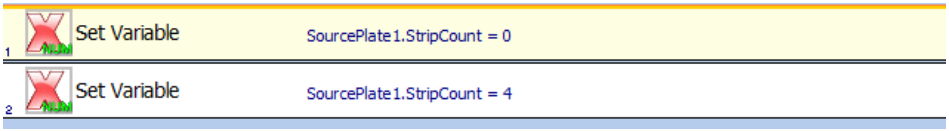

Fig. 17-13 *Assigning a value to StripCount*

- Specify the variable name as <labware_label>.<internal name of attribute> (see 14.1.11.1 “Labware Attributes and String Variables in Freedom EVOware Plus”, 14-18).
- In the Columbus - Wash Plate command, choose Wash Mode = strip on the General tab (see 16.6.1.1 “General Tab of the Columbus Washer - WashPlate Command”, 16-20).

Note: *If you specify values for both parameters, StripCount has priority over StripMask.*

17.6 Configuring and Using PMP (Pressure Monitored Pipetting)

Pressure Monitored Pipetting is a hardware option for the liquid handling arm that monitors the pressure in the airgap between the sample and the system liquid during aspiration and dispensing. The pressure curves are used to detect pipetting errors.

PMP is only available for 200 µl and 1000 µl LiHa DITI tips. It requires a special tip adapter and control electronics. Either four or eight tip positions can be fitted with the PMP option.

The PMP settings can be configured for each liquid class (liquid type).

In addition, the PMP hardware allows pressure-based pipetting error detection, clot detection and liquid level detection (pLLD).

Note: *PMP uses small diameter tubing. For this reason, if your pipetting instrument is fitted with the MPO option, do not use a Fast Wash flow rate in excess of 80% (see 8.4.2.3 "MPO/SPO and LICOS", 8-29).*

17.6.1 Activating the PMP Option

The PMP features are only available if the PMP option has been activated with the *Start* checkbox in the Configuration Tool (see 8.4.1.1 "Device Information Tab", 8-21).

If Freedom EVOware is running in normal mode and connected to a pipetting instrument, the PMP option is detected automatically. However, you still need to configure the LiHa settings in the Configuration Tool to indicate which of the tip positions are fitted with DITIs.

The PMP option is used for two separate functions:

- Pressure-based liquid level detection (pLLD),
- Pressure-monitored pipetting (PMP) = detection of pipetting errors during aspiration and dispensing.

Enabling pLLD

Pressure-based liquid level detection (pLLD) is selected with the Detection Mode pull-down list on the Global tab of the respective liquid class. You can configure to use pLLD, cLLD or both systems in parallel. pLLD requires the PMP hardware option but can also be used for conventional (non-pressure monitored) pipetting (you do not need to specify the Activate PMP script command if you only want to use pLLD).

Enabling PMP

PMP must be activated in your pipetting script with the Activate PMP script command before getting (mounting) the PMP-controlled DiTis.

PMP requires special liquid class settings. Default PMP liquid classes are provided on the Freedom EVOware installation CD as an .exd file for the Export/Import tool (see A.9.4 "Export/Import Tool", A-38). See the PMP Option Application Manual (DocID 395390) for more details. See also 10.7.4 "Liquid Classes on the Freedom EVOware CD", 10-49, PMP section.

Error handling for PMP clot detection is configured on the Aspirate tab of the liquid sub-class. Liquid level detection should always be enabled for aspiration when using PMP.

Working offline with pLLD and PMP

If you want to test a script or process with Freedom EVOware running in offline mode, you must check the PMP checkbox in the Configuration Tool for each of the tip positions which are fitted with a PMP tip adapter (see 8.4.2.1 "LiHa (Liquid Handling Arm)", 8-22). PMP is only available for LiHa DiTi tips (the checkboxes are only shown in the Configuration Tool if Tip Type is set to DiTi).

Offline mode does not simulate the PMP functions, so PMP is ignored in this case. In addition, PMP is not supported by the 3D simulation tool EVOSim. If you are using EVOSim, Freedom EVOware will display an error message when it starts and PMP will be ignored.

17.6.2 Permissible sequence of script commands for the PMP option

PMP must be activated in your pipetting script with the Activate PMP script command before getting (mounting) the PMP-controlled DiTis.

PMP must be deactivated again with the Deactivate PMP script command after finishing the pipetting sequence and dropping the DiTis. All PMP-controlled DITIs must be dropped before deactivating PMP.

Monitoring of the airgap pressure is started when the Activate PMP command is executed in the pipetting script and stops again when the Deactivate PMP command is executed.

The default directory which PMP uses to store evaluation configuration data and pressure curves (the PMP data directory) is as follows:
C:\Program Files\Tecan\EVOware\PMP\Curves (Windows XP) or
C:\ProgramData\Tecan\EVOware\PMP\Curves (Windows Vista).

The file names are XXXX_C_YYMMDD_HHMMSS.pmd.zip, where XXXX is a sequence number, C is the channel (tip) number, YYMMDD is the creation date (year, month day) and HHMMSS is the creation time (hours, minutes and seconds), for example:
0106_4_080924_170619.pmd.zip.

The following restrictions apply to each PMP-controlled pipetting sequence (the pipetting commands between an Activate PMP command and a Deactivate PMP command):

- The PMP-controlled pipetting sequence must consist of one Aspirate command followed by one or more Dispense commands (i.e. single or multi dispensing).
- With the default configuration settings, the aspirate and (multi-)dispense sequence must not be followed by any more pipetting steps which use the same tips. This will result in a script validation error.
- Use the special configuration parameter Allow_Reuse_PMP if you need to carry out additional pipetting steps with the same tips after finishing the PMP-controlled aspirate and dispense sequence. The additional pipetting steps will be carried out using standard pipetting and not using PMP. See A.3 “Parameters in the Evoware.opt file”, A-17, [DITI] section.
  - Although a pressure curve is generated from the Activate PMP command (before DiTi pick-up) to the Deactivate PMP command (after multiple aspirate/dispense cycles and after finally dropping the DiTis), only the first aspirate/dispense cycle is evaluated for PMP errors.
- pLLD is only allowed for the first command in a pipetting sequence (the Aspirate command).
- The Liquid Class option *Mix before Aspiration* is not allowed within the PMP-controlled pipetting sequence.

17.6.3 PMP Pressure Viewer Tool

Pressure Viewer

The PMP Pressure Viewer is a software tool to view the gradient of the pressure measurement performed by the PMP (Pressure Monitored Pipetting) option of Tecan pipetting instruments.

Purpose of This Chapter

This chapter instructs the user how to use the pressure viewer and how to view the curve graphs produced by the PMP option.

Starting the Pressure Viewer

To start the pressure viewer, double-click the icon or run the program PressureViewerLight.exe in the directory C:\Program Files\Common Files\Tecan\Common Driver\PMP Driver\2.2.2 (or a later version).

Main Window

The main window represents a p/t (pressure/time) diagram.

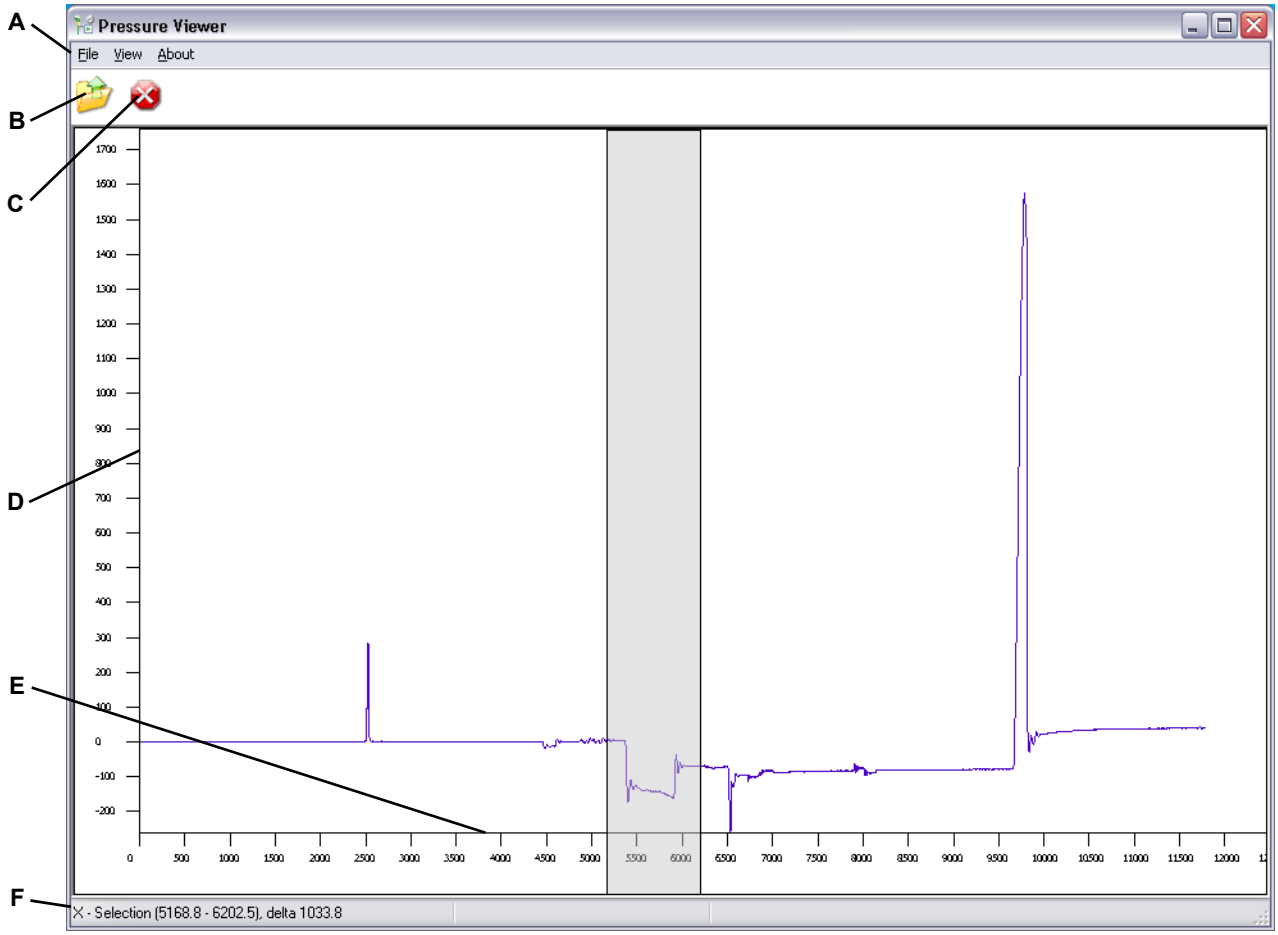

Fig. 17-14 *Pressure viewer main window*

A	*Menu bar*	***D***	*Y-axis*
B	*Task bar: Open icon*	***E***	*X-axis*
C	*Task bar: Close icon*	***F***	*Status bar*

Menu Bar

Menu File

The menu **File** contains the following commands:

- **Open**
  - The **Open** command opens a file browser which allows you to select one or several pressure curve files.
  - Click on **Open** in the file browser to display the curve graphs.
  - Click on **Cancel** to close the browser, the display in the main window remains unchanged.

- **Open Folder**
  - The **Open Folder** command opens a file browser which allows you to select a folder.
  - Click on **OK** in the file browser to display the curve graphs of all pressure curve files in the folder.
  - Click on **Cancel** to close the browser, the display in the main window remains unchanged.
- **Close All**
  - The **Close All** command clears the display of the main window, i.e. no curve graphs are loaded any more.
- **Quit**
  - The **Quit** command quits the pressure viewer.

Menu View

The menu **View** contains the following commands:

- **Zoom Selection**
  - The **Zoom Selection** command zooms on the section of the curve graph selected with the mouse to be displayed in the main window.
- **Fit Plot**
  - The **Fit Plot** command adapts the size of the curve graph to fit in the actual size of the main window.
- **Show Axis**
  - The **Show Axis** command switches between axes shown or not shown.

Menu About

The menu **About** opens the Information window.

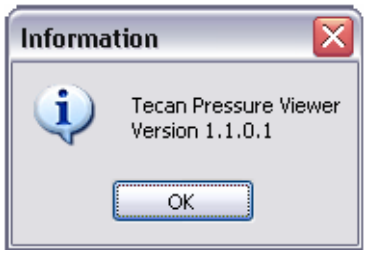

Fig. 17-15 *Information window*

The **Information** window displays the name and the version of the application. Click on **OK** to close the window.

Task Bar

The task bar offers the following functions:

Tab. 17-1 *Icons in task bar*

Icon	Function
Open (B, see Fig. 17-14, 17-19)	Same as menu **File** > **Open**
Close (C, see Fig. 17-14, 17-19)	Same as menu **File** > **Close All**

Status Bar

The status bar displays the coordinates of the mouse cursor if positioned on the curve graph.
If a selection was made, the X-coordinates of the selection (begin, end and width) is displayed.

Hot Keys (Shortcuts)

The following hot keys are available:

Tab. 17-2 *Icons in task bar*

Hot key	Function
Ctrl + O	Same as menu **File** > **Open**
Ctrl + Z	Same as menu **View** > **Zoom Selection**
Ctrl + F	Same as menu **View** > **Fit plot**
Ctrl + A	Same as menu **View** > **Show axis**

Function

The pressure viewer draws the curves graphs that are stored in the files *.pmd.zip, which are produced by the PMP option.
Each file is associated with the pipetting cycle of a specific pipetting tip.
If several files are opened each curve graph is drawn in a different color.

How to View Curve Graphs

Use one of the above mentioned methods to open one or several of these files to evaluate the pressure gradient of the corresponding pipetting cycle.

Note: *The pressure curve files can also be opened or added by dragging and dropping the file from the Windows explorer to the main window of the pressure viewer.*

While loading one or several pressure curve files a **Progress** dialog appears showing a progress bar. The dialog also gives information on the file name being loaded and the actual number of files as well as the total number of files to be loaded.
To cancel the process, click on **Cancel** in this dialog.
Select a part of the curve with the left mouse button to define the zoom section.
If only a part of the curve graph is displayed due to a zoomed selection, horizontal and vertical sliders appear and enable you to scroll along the curve graph.

Evaluation of Curve Graph

One or several curve graphs show the pressure gradient of the corresponding file.
If the axes are shown, they represent the following absolute values.

- X-Axis
  - The X-axis represents the time in ADC (Analog to Digital Converter) steps.
    - One ADC step equals 2 ms.
- Y-Axis
  Before each measurement the y-axis value is set to zero, i.e. 0 pADC equals ambient pressure.

– The Y-axis represents the pressure in pADC (pressure value of Analog to Digital Converter).
  • To calculate the (relative) pressure in Pa use the formula: p[Pa] = pADC * 3.469.

17.6.4 PMP Error and Success Messages

The PMP option can output the following error and success messages:
Aspiration messages:

- Correct (success message)
- Clot
- Clogged
- Nullcurve
- ShortBubblesCorrect (success message)
- MediumLeakageShort
- LeakageCorrect (success message)
- AspirationError
- PlausibilityCheckFailed
- Default (used if the error message did not contain any of the above strings)

Dispense messages:

- Correct (success message)
- UnderDispense
- AspirateRejection

The messages are shown as strings in the Freedom EVOware log file. See also A.10 “LogViewer Tool”, A-72. Refer to the PMP Option Application Manual (Doc ID 395390) for descriptions of these messages and for information on when they can occur.
The PMP software maps the above error messages to (a) actions to be taken by Freedom EVOware if the errors occur and (b) internal PMP error flags. The PMP error flags are associated with pipetting error codes in the report file which is created by the Export Data command (see 15.26 “Export Data Command”, 15-48).

Note: *The error mapping is specified in the configuration file for the PMP driver and should only be changed by a trained Tecan application specialist.*

The Clot error is normally configured to display the Clot Error (PMP) dialog. See 18.1.3 “Clot Error (PMP)”, 18-3 for more information.
The following table shows the default error handling which takes place if a PMP error is detected during aspiration:

Tab. 17-3 *Default actions for PMP aspiration errors*

Error message [a]	**Action taken with the default PMP configuration**
Clot	• Use PMP clot error handling defined in liquid class
Clogged	• Continue, dispense back and pipette nothing
NullCurve	• Continue, dispense back and pipette nothing

Tab. 17-3 Default actions for PMP aspiration errors (cont.)

Error message [a]	Action taken with the default PMP configuration
MediumLeakageShort	• Continue, dispense back and pipette nothing
Default [b]	• Ignore, continue pipetting
AspirationError	• Continue, dispense back and pipette nothing
PlausibilityCheckFailed	• Ignore, continue pipetting

a) These strings are also shown in the Freedom EVOware log file
b) This error is output if the PMP result is not available or none of the other errors are applicable

Clot error is the only PMP error which allows operator intervention (see 18.1.3 “Clot Error (PMP)”, 18-3). See also 10.2.1 “LiHa Aspirate Parameters (Fixed Tips and DiTis)”, 10-7, ON PMP Clot Error).

The following table shows the default error mapping to internal PMP error flags if a PMP error is detected during aspiration:

Tab. 17-4 Default error mapping for PMP aspiration errors

PMP Error Message	Default mapping to internal PMP error flags
Clot	• E_PMPDetectedTipOcclusion
Clogged	• E_PMPInstrumentError
NullCurve	• E_PMPInstrumentError
MediumLeakageShort	• E_PMPUnspecifiedError
Default	• E_PMPUnspecifiedError
AspirationError	• E_PMPDeficientVolume
PlausibilityCheckFailed	• E_PMPUnspecifiedError

The following table shows the resulting pipetting error codes in the report file of the Export Data command for the four internal PMP error flags:

Tab. 17-5 Mapping between PMP error flags and pipetting error codes

PMP Error Flag	Pipetting error code
• E_PMPDetectedTipOcclusion	400 (hex)
• E_PMPDeficientVolume	800 (hex)
• E_PMPInstrumentError	2000000 (hex)
• E_PMPUnspecifiedError	4000000 (hex)

See Tab. 15-8 “Pipetting error codes in the report file output by the Export Data command”, 15-54 for more information.

17.7 Configuring the Waste Option of the Te-Stack in Freedom EVOware Plus

The following describes how to configure the double Te-Stack with the Waste option (waste chute) in Freedom EVOware Plus in order to achieve the following:

- Fetch labware from tower 2 (front Te-Stack)
- Return labware to tower 4 (front Te-Stack)
- Fetch DITI racks with fresh DITIs from towers 1 and 3 (rear Te-Stack)
- Return empty DITI racks to the rear Te-Stack, whereupon they will be discarded using the waste chute.

See Fig. 9-16, 🗎 9-43 for information on the default tower configuration (tower numbers) for a double Te-Stack. The Waste option for the Te-Stack is mainly intended for discarding empty DITI racks.

In this example, before the process starts, tower 2 should contain labware, tower 4 should be empty and towers 1 and 3 should both be filled with fresh DITI racks.

Note: *The following description applies to the double Te-Stack right (i.e. the Te-Stack is fitted on the right side of the worktable). The Te-Stack Left is a mirror image of the Te-Stack right. The following description is only relevant for Freedom EVOware Plus.*

A double Te-Stack has four towers and two RoMa transfer positions. The default position layout of the Te-Stack (2,2,50) configures the Te-Stack device carrier as a two site carrier and the double Te-Stack is configured as as a single Freedom EVOware device. For this example, it is necessary to subdivide the double Te-Stack into two separate devices. This is because we want to configure the rear towers to function differently to the front towers.

Proceed as follows:

Te-Stack Rear

Duplicate the device carrier “Te-Stack Right” and assign a meaningful name, e.g. “Te-Stack Rear”.

Set the position layout to 2,1,25 (each tower normally holds 25 DITI racks; adjust this value if necessary to suit the height of your DITI racks).

Click *Attributes*, add the attribute WasteLocation and set the value to “1”. This activates the Waste option for the Te-Stack.

Check that *Allowed labware* includes your DITI racks.

Create carrier for the worktable

Duplicate the device carrier “Te-Stack Right” and assign a meaningful name, e.g. “Te-Stack Worktable”.

Uncheck *Carrier is device*. This allows you to put the carrier on the worktable.

Set the position layout to 1,2,1 (two site worktable carrier)

Click *Attributes*, and set Allowed Robots to “Te-Stacker” (the call name of the Te-Stack driver).

Check that *Allowed labware* includes your DITI racks and microplates.

Put the new carrier on the worktable.

Te-Stack Front

Rename the device carrier “Te-Stack Right” to “Te-Stack Front” or something similar.

Set the position layout to 2,1,50 (each tower normally holds 50 microplates; adjust this value if necessary to suit the height of your labware)

Check that *Allowed labware* includes your microplates.

Driver settings

Start the Configuration Tool and adjust the Te-Stack driver settings as follows:

On the Towers tab:

- Choose the location “Te-Stack Front” for towers 2 and 4.
- Choose the location “Te-Stack Rear” for towers 1 and 3.

On the Locations tab:

- Set Number of locations to “2”.
- For location 1: Choose Te-Stack(1,1,1) and the master ID from Te-Stack Front.
- For location 2: Choose Te-Stack(1,2,1) and the master ID from Te-Stack Rear.

Put the carrier “Te-Stack Worktable” on the extreme right of the worktable. The LiHa/MCA script should be programmed to use DITIs from site 1 of this carrier (rear site) and to use labware from site 2 of this carrier (front site).

For increased performance (speed) of the process, you should pick up the DITIs with the LiHa or MCA directly from the RoMa transfer position of the Te-Stack (site 1 of the “Te-Stack Worktable” carrier) instead of using the RoMa to bring the DITI rack to another position on the worktable first. In this case, after creating the LiHa Pipette process step, change the pre-actions and post-actions for site 1 of this step from RoMa_ReplaceObject to RoMa_Moveobject (see 9.10.3 “Pre-actions / Post-actions (Custom)”, 9-72).

17.8 Handling inserts in Freedom EVOware Plus

The following information about insert handling is only relevant to Freedom EVOware Plus.

An insert is not an independent labware item, but is part of a special labware type (“insert plate”) and is similar to a lid. The insert can be removed from the insert plate using the RoMa or another robot arm. The part that remains after removing the insert is sometimes called a base plate.

To specify that labware can have an insert, check the “Labware can have insert” checkbox in the Edit Labware dialog box (Advanced tab). In the example below, this checkbox must be checked for both source and destination labware items.

When you put an insert plate on the worktable, Freedom EVOware automatically assumes that it already contains an insert (the insert attribute of the labware is set to “1”). The RoMa command SwapInsert moves the insert of an Insert plate to another Insert plate. However, you can only do this if the destination plate does not currently contain an insert.

The following lines must be added to the Te-LiHa.ini file to specify that the destination plate does not contain an insert:

```
[Class2]
Name=labware_type_LT
Parent=LabwareInsertType
```

Slot1=Insert:Integer:0

Replace “labware_type” by the labware type of the destination plate (replace space characters by underscores “_”) and append the string “_LT”.

For example Name=caco_baseplate_LT

Save the file after making your changes. Configuration files are protected with checksums. Accordingly, you must now repair the checksum as follows:

- Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see A.9.2 “Validate Configuration Tool”, A-36).
- You must then quit Freedom EVOware, un-load the drivers and restart Freedom EVOware. To do this, choose *Exit, unload drivers* in the File menu. This ensures that the driver configuration files (ini files) will be read again when Freedom EVOware is re-started.

Note: *You must also restart Freedom EVOware and the drivers each time you edit the insert plate labware, since the process of editing sets the insert attribute of the labware to “1” again.*

Moving the insert with the RoMa_SwapInsert command

The following example shows how to use the RoMa_SwapInsert command to move an insert from the insert plate caco-1 (labware type caco) to the insert plate base-2 (labware type caco_baseplate) before pipetting. This is done by adding the RoMa_SwapInsert command as a custom pre-action to the LiHa process step. For this example, the type of the source and destination labware must be different.

The following figure shows the worktable and the lower Infopad with the destination plate selected:

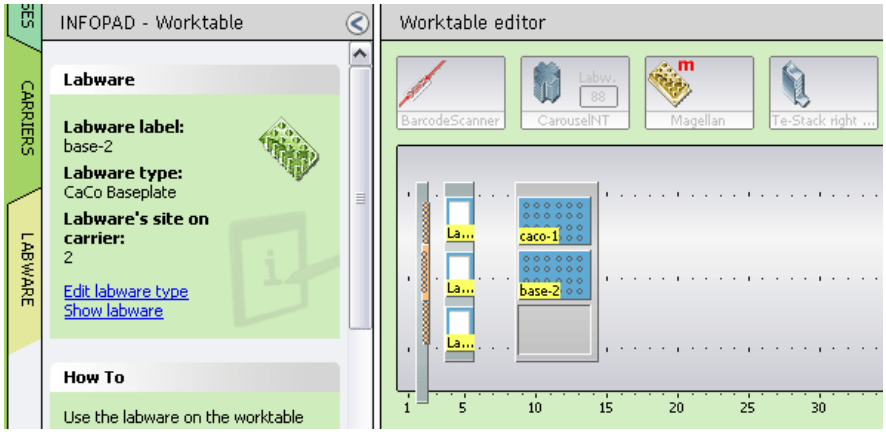

Fig. 17-16 *Example process - Worktable and infopad*

The following figure shows the example process and the default pre-actions for the LiHa process step:

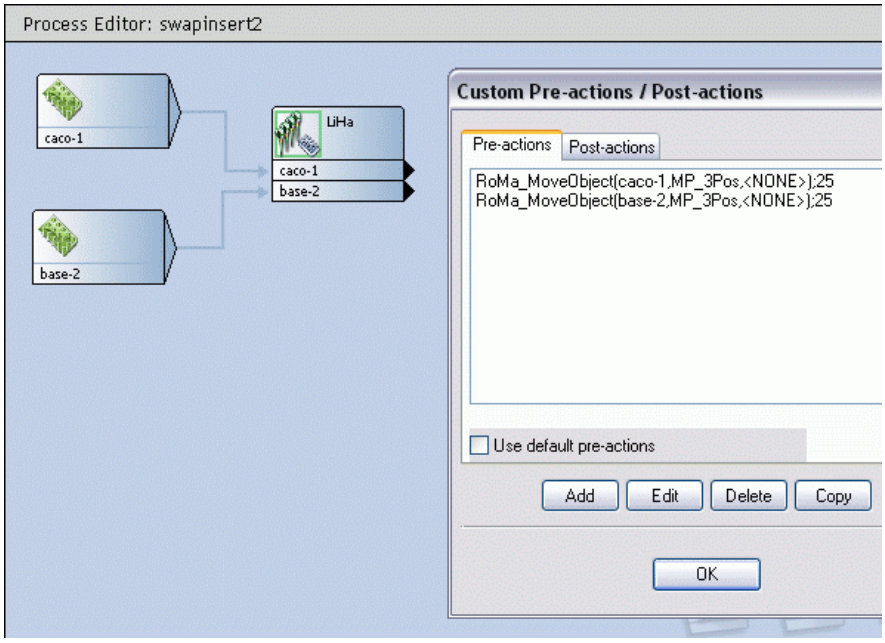

Fig. 17-17 *Example process and default pre-actions*

Proceed as follows to add the RoMa_SwapInsert command as an additional pre-action:

Right click the LiHa process step and choose Pre-Actions / Post actions. This opens the Custom Pre-Actions / Post actions dialog box.

Click Add and choose the RoMa_SwapInsert command from the drop-down list.

Choose caco-1 as the value of the Object MPI parameter, base-2 as the value of the Object MPI2 parameter and NONE as the value of the ToolOnTheFly parameter.

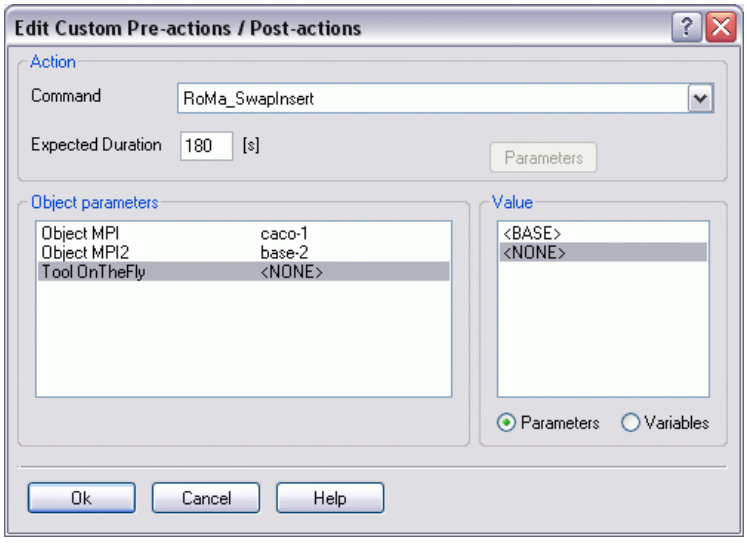

Fig. 17-18 *Example process - Adding the RoMa_SwapInsert command*

Click OK when you have done this. The following figure shows the pre-actions with the RoMa_SwapInsert command you have just added:

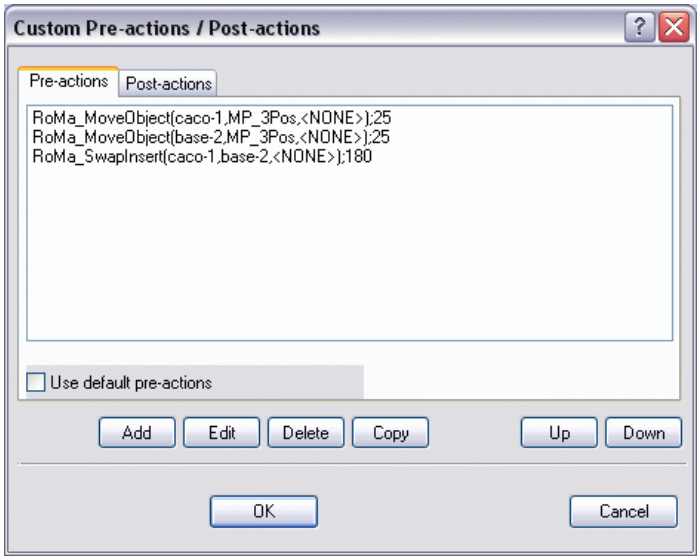

Fig. 17-19 *Example process - Custom pre-actions*

Click OK again when you are finished.

17.9 Using Freedom EVOware with the Tecan Magellan Software

This chapter describes how to set up Freedom EVOware (either Freedom EVOware Standard or Freedom EVOware Plus) for use with the Tecan Magellan data reduction software.

The Tecan Magellan software is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. The Magellan software must be installed separately.

17.9.1 Compatibility

This chapter describes the configuration steps which are necessary for Magellan Standard 6.5 and Magellan Tracker 6.5. To check your Magellan version, check the splash screen when Magellan starts or refer to the Magellan help file.

The Tracker version of Magellan contains special tracking features which are required for compliance with the FDA regulations.

Note: *The splash screen which is shown when Magellan starts tells you if you have installed Magellan Standard or Magellan Tracker. Magellan Tracker uses the Tecan User Management system and requires you to enter a user name and password.*

17.9.2 Preparing the Magellan Software

Make sure that Magellan is correctly installed and is configured for the microplate reader and the COM port that you want to use. To check this, start the Magellan Wizard, click Instrument Control and Click Change Instrument.

If you don't have a reader connected to the PC and want Magellan to simulate a reader, choose the reader you want to simulate, choose Demo mode in the Port panel and None in the Stacker Port panel. Refer to the Magellan manual for more information.

Magellan is also provided with a tool (MagellanIQ) to check that the software has been correctly installed and configured. MagellanIQ can be started with the shortcut in Start > All Programs > Tecan.

17.9.2.1 Methods and Workspace Files in Magellan

Method files contain all of the necessary parameters for the measurement, evaluation and data handling of an assay. Workspace files are created when a method is run and contain measured and calculated data as well as all of the method settings.

Methods and workspace files are reader-specific. For example, a method file for the Sunrise reader can only be used with this reader type. Accordingly, when you want to open a method or workspace file in the Magellan wizard, the *Select a file* dialog box will initially only show methods and workspace files which are compatible with the currently configured reader type.

Choose *All files* instead of *Files from this instrument* in the *Select a file* dialog box to see files which were created for other reader types, too. If the reader has equivalent measurement modes to the currently configured reader type, Magellan will ask you whether you want to convert the file.

Furthermore, methods and workspace files which were created with Magellan Standard cannot be used in Magellan Tracker, and will not be shown in the *Select a file* dialog box. This is because Magellan Tracker methods and workspace files contain additional tracking information which is needed for regulated environments.

Note: *The sample methods and workspace files which are provided with Magellan Tracker were created using Magellan Standard and are not shown in the Select a file dialog box of Magellan Tracker. Magellan includes a conversion tool which lets you convert Magellan Standard files to Magellan Tracker files.*

In Freedom EVOware too, the Method Selection dialog box of the Magellan Measure device command only shows methods which are compatible with the currently configured reader type and Magellan version (Standard or Tracker). See 17.9.3.3 “Specifying the Reader Type in Freedom EVOware”, 17-31.

17.9.3 Configuring Freedom EVOware for the Magellan software

Start Freedom EVOware’s Configuration Tool, click the Devices tab, click Device Information and look for the Magellan device driver in the list.

If the Magellan driver is missing, then it is not installed. Refer to the Installation chapter in the Freedom EVOware manual for information on installing software components which are missing.

Select the Magellan driver and check that the version is correct (see 17.9.1 “Compatibility”, 17-29).

Check the Start checkbox for the Magellan driver to make sure that it will be loaded when Freedom EVOware starts.

Note: *If you change configuration settings in Freedom EVOware’s Configuration Tool, in most cases Freedom EVOware must be restarted for the changes to take effect.*

17.9.3.1 Magellan Output File (Workspace File)

In Freedom EVOware’s Configuration Tool, select the Magellan driver, click Settings and choose the Settings tab in the Configure Device Driver Properties dialog box.

In the *Output File Default* field, specify the required default filename and path for the calculated results (workspace file) from the Magellan software. The default filename and path which you specify here will then be shown in the dialog box of the Magellan Measure command (see Fig. 17-23, 17-36).

Magellan Standard

Path: Specify the path which is configured in Magellan for workspace files. This makes it easier to load the generated workspace files if you run Magellan on its own later on.

Filename: If you are using a barcode scanner, you should specify the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. It is not necessary to specify the file extension (which is .wsp). Note: The labware must be scanned in advance of the Magellan Measure command.

Examples:

c:\Documents and Settings\All Users\Documents\Tecan\Magellan\<ID>

or

c:\Program Files\Tecan\EVOware\Output\<ID>

Note: *To check the paths which are configured in Magellan, start the Magellan Wizard, click More and click Options. Then choose the Paths tab.*

Magellan Tracker

Path: Magellan Tracker stores the workspace files in the path which is configured in Magellan and ignores the path that you specify here. Accordingly, it is recomended to leave the Output File Default field blank for Magellan Tracker. The filename and path of the workspace file will then be taken from the settings which were made in the Magellan method.

Filename: If you are using a barcode scanner, you should specify the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. It is not necessary to specify the file extension (which is .wsp). Note: The labware must be scanned in advance of the Magellan Measure command.

Example:
c:\Documents and Settings\All Users\Documents\Tecan\Magellan\wsp\<ID>

Note: *In both Magellan Standard and Magellan Tracker, if you leave the Output File Default field blank in Freedom EVOware, the filename and path of the workspace file will be taken from the settings which were made in the Magellan method.*

Note: *In Windows Explorer, the directory c:\Documents and Settings\All Users\Documents is shown as "Shared Documents" and not "Documents".*

17.9.3.2 Specifying the Reader COM port in Freedom EVOware

Start Freedom EVOware's Configuration Tool, click the Devices tab, click Com Ports and select the COM port for the Magellan driver (the COM port to which the reader is attached). The same COM port should be configured in the Magellan software (see 17.9.2 "Preparing the Magellan Software", 17-29).

Then click the I/O State tab and make sure that the COM port for the Magellan driver is enabled (active).

If you do not have a reader connected to your PC, disable the COM port by unchecking the checkbox. Nonetheless, you should still specify a valid COM port as described above.

Note: *Unlike using the Magellan software on its own, Freedom EVOware cannot currently simulate a missing reader. If you do not have a reader connected to your PC, the Magellan Measure command in the Freedom EVOware pipetting script should execute without errors but will not create an output file (workspace file).*

17.9.3.3 Specifying the Reader Type in Freedom EVOware

If there is a reader connected to your PC, the Magellan Measure command in the Freedom EVOware pipetting script will use the reader type which is attached to the COM port which you have specified.

Note: *Freedom EVOware gets the reader type by asking the reader driver to interrogate the reader. Accordingly, the reader must be connected up and switched on when you create the pipetting script.*

If you do not have a reader connected to your PC, the Magellan Measure command in the Freedom EVOware pipetting script will use the reader type which is configured in the Te-Magellan.ini file in Freedom EVOware's installation directory (default path c:\Program Files\Tecan\EVOware. The reader type is

configured in the [Settings] section with the switch Simulation=. The available reader types are listed in the [DemoInstruments] section.
If you do not have a reader connected to your PC, you must disable the COM port as described in 17.9.3.2 “Specifying the Reader COM port in Freedom EVOware”, 17-31.

Note: *Method files are reader-specific. In Freedom EVOware, the Method Selection dialog box of the Magellan Measure command only shows methods which are compatible with the currently configured reader type.*

17.9.4 Freedom EVOware Standard Script for the Magellan software

The following figure shows a simple example script for Freedom EVOware Standard which uses the Magellan Measure script command:

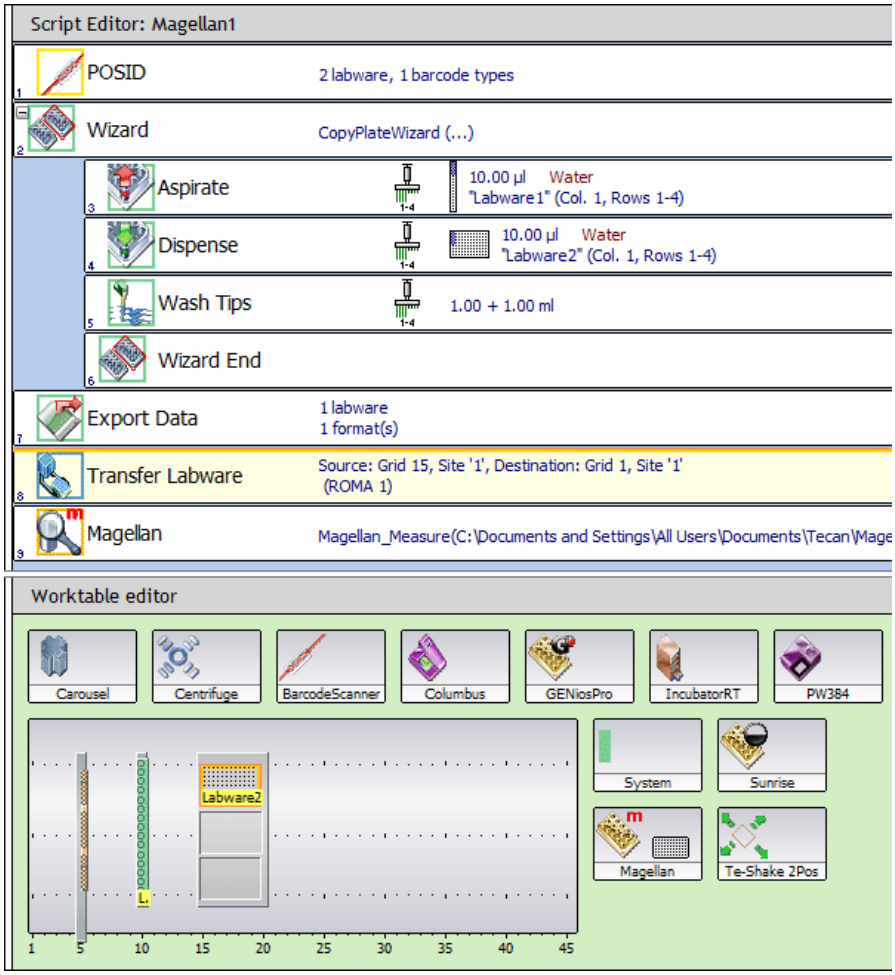

Fig. 17-20 *Example pipetting script and worktable for Freedom EVOware Standard*

In the example, the worktable has been configured with a wash station at grid position 5, a tube rack at grid position 10 (labware name: Labware1) and a microplate carrier at grid position 15 (labware name: Labware2). A microplate has been put on site 1 of the carrier.

In Freedom EVOware Standard, it is also necessary to put a microplate of the correct type onto the Magellan device icon. This is shown by the grey rectangle inside the icon. This is not necessary in Freedom EVOware Plus.

Note: *Make sure you have chosen the same microplate type which you want to use in the script. Refer to the hardware manual for your reader for information on the microplate types which are supported (96-well, 384-well etc.).*

Please refer to the Freedom EVOware software manual or the context-sensitive help for detailed information on each of the script commands. The following only describes special points to note when setting up scripts for the Magellan software.

In the example, the labware and tube (sample) barcodes are scanned in script line 1 using the PosID barcode scanner. The following figure shows the Scan tab of the PosID command:

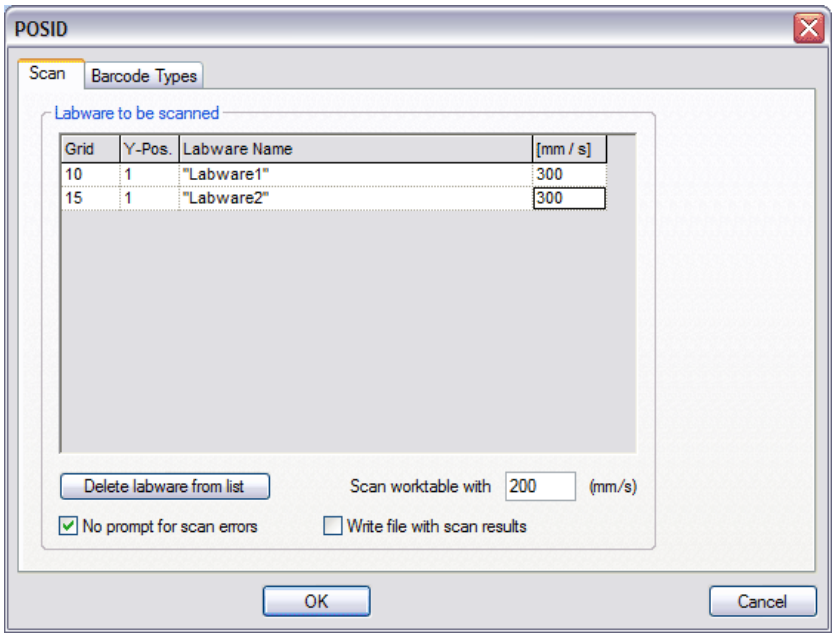

Fig. 17-21 *PosID command*

The Barcode Types tab is used to configure the barcode types which the PosID scanner will accept for the chosen labware.

The labware and tube barcodes must be scanned in advance of the Export Data and Magellan Measure commands. In Freedom EVOware Plus, the PosID and Export Data commands must be in the same pipetting script since the tube barcodes are not normally available globally (see the description of Scope in the Freedom EVOware software manual). See also 17.9.6 “Freedom EVOware Plus Process for the Magellan software”, 17-38.

With the above settings, the barcodes will be scanned for Labware1 (the tube rack) and Labware2 (the microplate).

In script lines 2 to 6, the sample liquids are transferred from the tube rack to the microplate using the Copy Plate wizard.

The Magellan Measure command in script line 9 gets important information it needs from a labware report file in CSV format which is output by the Export Data command in line 7. The following figure shows the dialog box for the Export Data command:

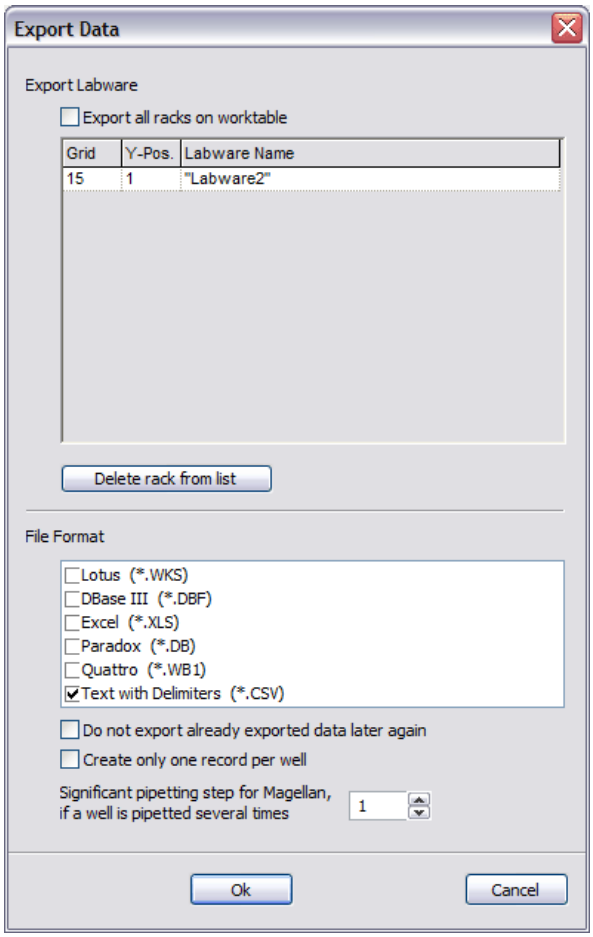

Fig. 17-22 *Export Data command*

The labware report file will contain pipetting information for Labware2 (the microplate). It will also contain the microplate and tube (sample) barcodes which were scanned by the PosID command. The labware report file is written to the Output directory which is specified in Freedom EVOware's Configuration Tool. Freedom EVOware sends the name and location of this file to the Magellan driver automatically (you do not need to configure the Freedom EVOware Output directory in the Magellan software).

Significant pipetting step for Magellan is set to "1" since only one pipetting step was carried out on Labware2 (the Dispense command in script line 4). See the Freedom EVOware manual for more information on this option.

The Transfer Labware command in script line 8 moves the microplate from the worktable to the microplate reader. If you want to use the Magellan software to control the reader, when you configure the Transfer Labware command you must choose the Magellan device icon in the worktable editor as the destination position of the microplate, not the device icon for the reader itself.

Note: *The labware must be brought to the reader using the Transfer Labware command and not using another RoMa command. Otherwise the barcodes and the pipetting information will not be transferred with the labware.*

The Transfer Labware command is not available in Freedom EVOware Plus. See 17.9.6 “Freedom EVOware Plus Process for the Magellan software”, 17-38 for more information.

The following figure shows the dialog box for the Magellan Measure command in script line 9:

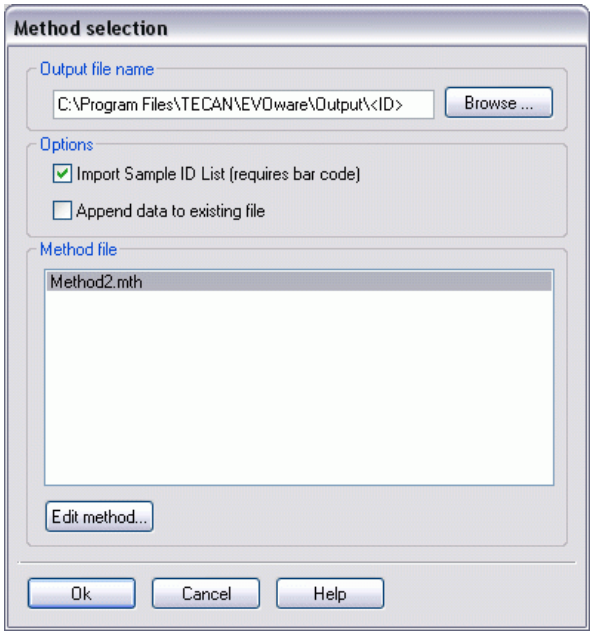

Fig. 17-23 *Magellan Measure command*

Output file name

Specify the required filename and path of the output file (workspace file). The default filename and path which is shown is the one you specified in Freedom EVOware's Configuration Tool (see 17.9.3.1 "Magellan Output File (Workspace File)", 17-30).

If you are using a barcode scanner, you should specify the filename as the placeholder <ID>, which will instruct Freedom EVOware and thus Magellan to generate the filename from the labware barcode. The labware must be scanned in advance of the Magellan Measure command.

Note: *In both Magellan Standard and Magellan Tracker, if you leave the Output File Name field blank in Freedom EVOware, the filename and path of the workspace file will be taken from the settings which were made in the Magellan method.*

Import Sample ID list

Check the *Import sample ID list* checkbox if you have scanned the tube barcodes in advance of the Magellan Measure command. This instructs the Magellan software to extract the tube barcodes from a labware report file and assign them to the samples. The barcode information will then be contained in

the Magellan output file (workspace file) which is produced. The workspace file will also contain information from Freedom EVOware on pipetting errors (if any). The barcodes and pipetting errors can then be viewed by loading the generated workspace file in Magellan.

To create a labware report file, you must use the script command Export Data before using the Measure command for the Magellan software.

Freedom EVOware Standard: The labware must be brought to the reader using the Transfer Labware command and not using another RoMa command. Otherwise, the barcodes and the pipetting information will not be transferred with the labware.

Freedom EVOware Plus: The PosID and Export Data commands must be in the same pipetting script since the tube barcodes are not normally available globally (see the description of Scope in the Freedom EVOware software manual).

Append data to existing file

Check this checkbox if you want to append the measurement data to an existing output file (workspace file). This option is mainly intended for kinetic measurements (frequent measurement of the reaction to determine the rate or progress). This option must be activated in all Magellan Measure commands in the kinetic series except for the first one. This option requires labware with barcodes (you must also check the checkbox *Import sample ID list*).

Edit method

Click this button to edit the selected method using the Edit Method wizard of the Magellan software. See 17.9.5 “Additional Settings for the Magellan Method”, 17-37 for more information.

Method file panel

The Method File panel only shows methods which are compatible with the currently configured reader type and Magellan version (Standard or Tracker). See 17.9.3.3 “Specifying the Reader Type in Freedom EVOware”, 17-31.

You can only edit the method if you have Application Specialist rights in Magellan.

17.9.5 Additional Settings for the Magellan Method

If you are using a barcode scanner and a labware report file, additional settings are needed for the Magellan method. To make these settings, select the required method file in the Magellan Measure command and click Edit Method. This opens the Magellan wizard. Select and open the method, choose the required measurement type and click the large green arrow. Then click *Automated data handling* in the *Data Handling* group of the Magellan Control Bar and make the following settings:

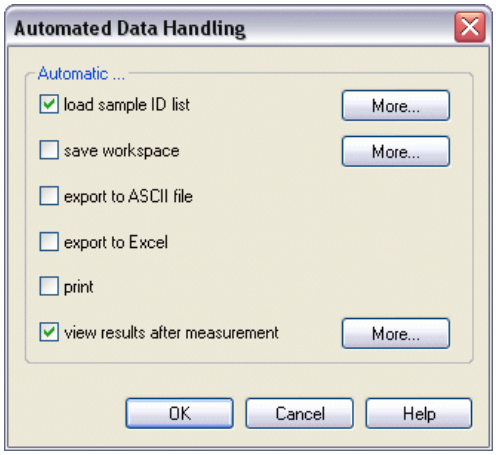

Fig. 17-24 *Magellan settings - Automated data handling*

Note: The checkbox *Save workspace* is not available in Magellan Tracker. The checkboxes for data export may not be available either depending on other settings you make in Magellan.
Now click the More button next to *Load sample ID List* and make the following settings:

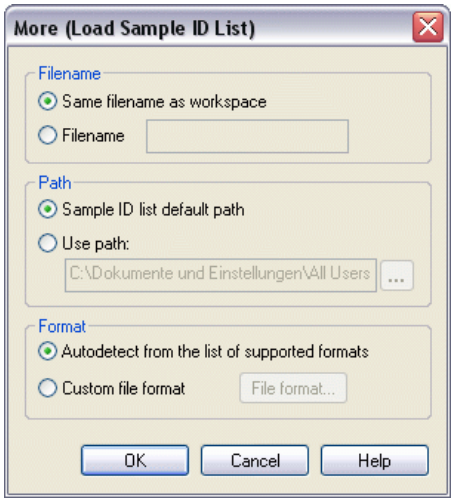

Fig. 17-25 *Magellan settings - Load Sample ID List*

Click OK twice when you are finished.

17.9.6 Freedom EVOware Plus Process for the Magellan software

The following figure shows a simple example process for Freedom EVOware Plus which uses the Magellan Measure device command:

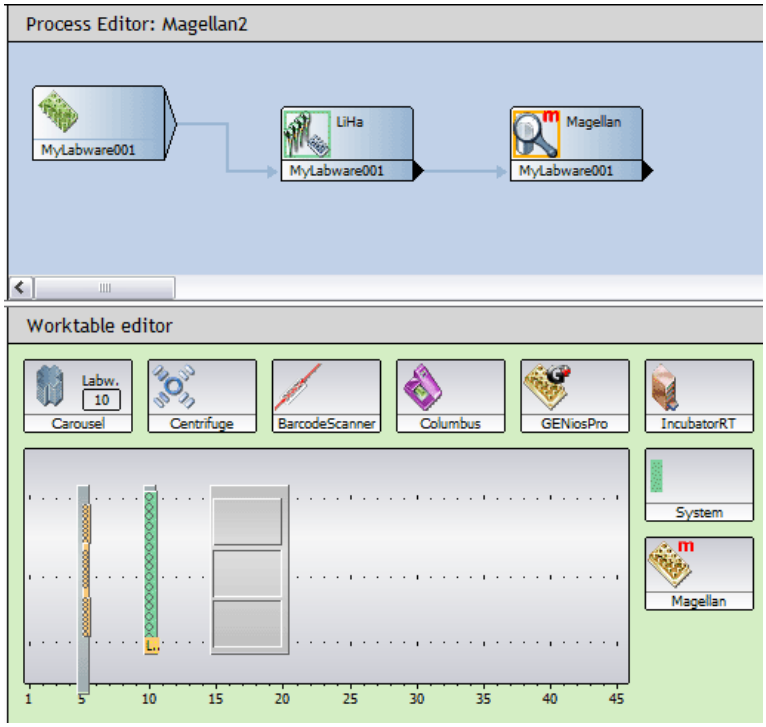

Fig. 17-26 *Example process and worktable for Freedom EVOware Plus*

In the example, the worktable has been configured with a wash station at grid position 5, a tube rack at grid position 10 (labware name: Labware1) and a microplate carrier at grid position 15. The carousel has been set up with 10 microplates.

In the Script Editor, a microplate was put on site 1 of the carrier and given the name Labware2. Since the microplate will be taken to this site dynamically during process run time, it is shown in grey in the Process Editor.

After pipetting, the microplate is transferred automatically to the microplate reader and scanned using a Magellan Measure command in the Magellan process step. The Transfer Labware command from the Freedom EVOware Standard example is not necessary (and not available in Freedom EVOware Plus). After scanning, the microplate will be returned to the carousel automatically.

The pipetting script in the LiHa Pipette process step is identical to lines 1 to 7 of the example script for Freedom EVOware Standard:

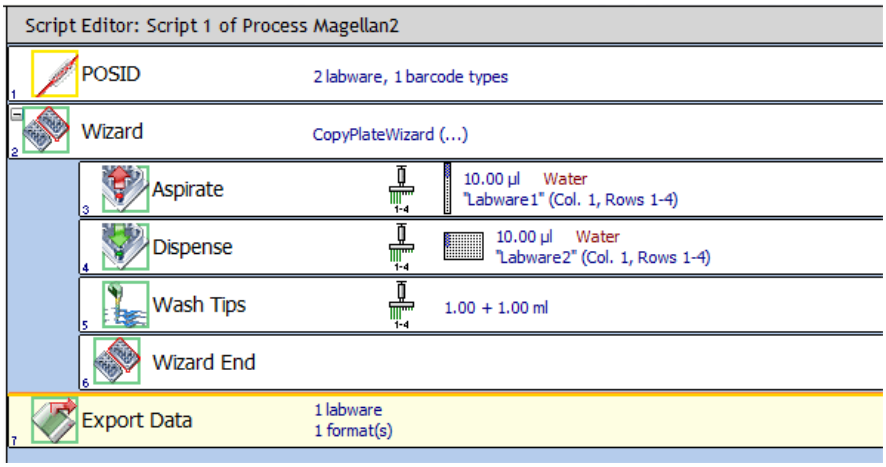

Fig. 17-27 *Example pipetting script for Freedom EVOware Plus*

See the example for Freedom EVOware Standard for more details on setting up the Magellan Measure, PosID and Export Data commands.

Configuration of the Magellan driver and the exchange of information between Freedom EVOware and the Magellan software takes place in the same way as in Freedom EVOware Standard.

Note: *The PosID and Export Data must be in the same pipetting script, as in the example, since the tube barcodes are not normally available globally (see the description of Scope in the Freedom EVOware software manual).*

17.10 Example Scripts and Processes

Freedom EVOware is provided with a number of example scripts which illustrate various aspects of script programming. It is instructive for new users of Freedom EVOware to load the scripts which are provided and to study each command while looking at the on-line help. For learning purposes, some of the scripts can also be run in offline mode. The scripts are stored as script templates. To load them, click New and select the required template.Script templates have a yellow icon.

Note that scripts will indicate errors (marked in red in the Script Editor) if the configuration of the pipetting instrument is unsuitable. For example, if the script uses DITIs, errors will be shown if the liquid handling arm is not configured with DITIs. Conversely, if the liquid handling arm is configured with DITIs, Aspirate commands must be preceded by Get DITI commands. Errors will also be shown if the script uses liquid classes or volume ranges which are not currently available.

In many cases, the purpose of each of the scripts is explained in a Comment command at the start of the script.

The Freedom EVOware installation contains a number of maintenance scripts (see 6.4.2 “Run Maintenance”, 🗎 6-10). Maintenance scripts can be run by both Freedom EVOware versions but can only be created and edited with Freedom EVOware Standard. Script files and maintenance scripts have a green icon.

Freedom EVOware Plus is also provided with an example process template, which is for the ELISA test (Enzyme immunoassay). Process templates have a blue icon.

18 Error Handling

Purpose of This Chapter

This chapter describes runtime error messages and the associated dialog boxes that can be issued by the software. It gives information on the cause of the error and instructs how to correct the error, where applicable.

18.1 Error Dialogs

Errors Requiring User Interaction

This section describes pipetting and hardware device error messages which require user interaction. Please see the description of the output file format from the Export Data command for information on the pipetting error codes which are reported. Errors are also reported in the Freedom EVOware log files.

18.1.1 Liquid Detection Error

The following dialog box is shown when the pipetting instrument reports a liquid detection error.

The dialog box shows the respective tip or tips with errors and the tip status. The last column display the detected volume:

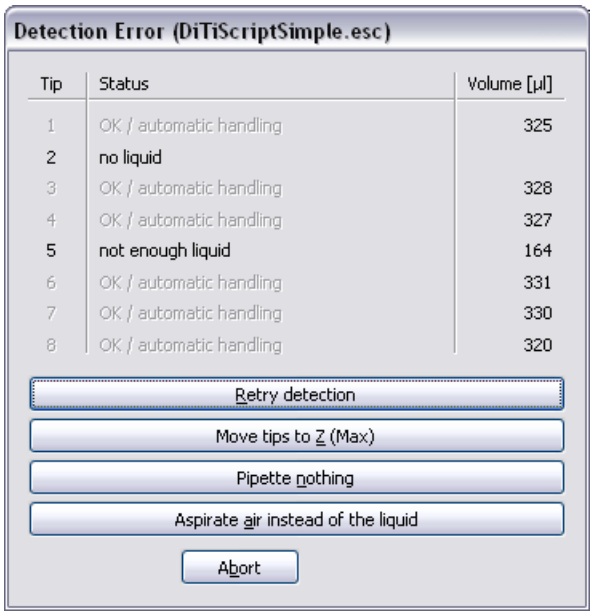

Fig. 18-1 *Liquid Detection Error dialog box*

The buttons in the dialog box are as follows. The actions described only apply to the affected tip positions - if the pipetting script is allowed to continue, the other tips will be handled in the normal way.

Retry detection

Click this button to retry the liquid level detection.

Move tips to Z (Max)

If you click this button, Freedom EVOware will move the tips to Z-Max and will try to aspirate the specified volume again.

Pipette nothing

If you click this button, Freedom EVOware will not use the affected tip(s) until the next Wash Tips or Get DITIs operation.

The affected wells won't be reported any more in the output files.

Aspirate air instead of the liquid

If you click this button, Freedom EVOware will pipette air instead of the liquid and will continue with the pipetting script.

Abort

Click Abort if you want to stop the pipetting script.

See also 10.2.1 “LiHa Aspirate Parameters (Fixed Tips and DiTis)”, 10-7, *On Detection Error.*

Note: *Liquid Level detection is not supported by the Te-MO. However, it can be emulated using the pre-defined variable RACK_VOLUME_x. Accordingly, if this error is reported by the Te-MO, this indicates that an unsuitable or incorrect value has been assigned to the RACK_VOLUME_x variable.*

18.1.2 Clot Error

The following dialog box is shown if the pipetting instrument reports a clot error or an exit signal error during pipetting. The dialog box shows the respective tip or tips and the tip status:

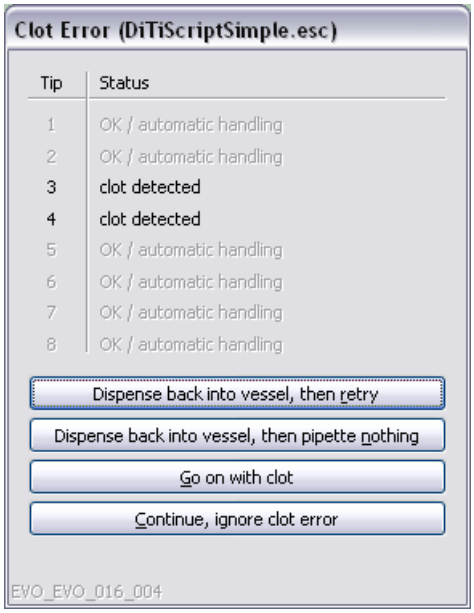

Fig. 18-2 *Clot Error dialog box*

The buttons in the dialog box are as follows. The actions described only apply to the affected tip positions - if the pipetting script is allowed to continue, the other tips will be handled in the normal way.

Dispense back into vessel, then retry

If you click this button, Freedom EVOware will dispense the aspirated volume back into the vessel and will retry the liquid level detection, aspiration, and clot detection.

Dispense back into vessel, then pipette nothing

If you click this button, Freedom EVOware will dispense the aspirated volume back into the vessel and will not use the affected tip(s) until the next Wash Tips or Get DITIs operation.

The affected wells won't be reported any more in the output files.

Go on with clot

If you click this button, Freedom EVOware will continue with the pipetting script and report the clot error in the output file(s).

Continue, ignore clot error

If you click this button, Freedom EVOware will continue with the pipetting script and report “clot error ignored” in the output file(s).

See also 10.2.1 “LiHa Aspirate Parameters (Fixed Tips and DiTis)”, 10-7, *On Exit Signal Error.*

18.1.3 Clot Error (PMP)

The following dialog box is shown if the PMP (Pressure Monitored Pipetting) hardware option detects a clot during pipetting.
PMP is only available for LiHa DITI tips. The dialog box shows the respective tip or tips and the tip status:

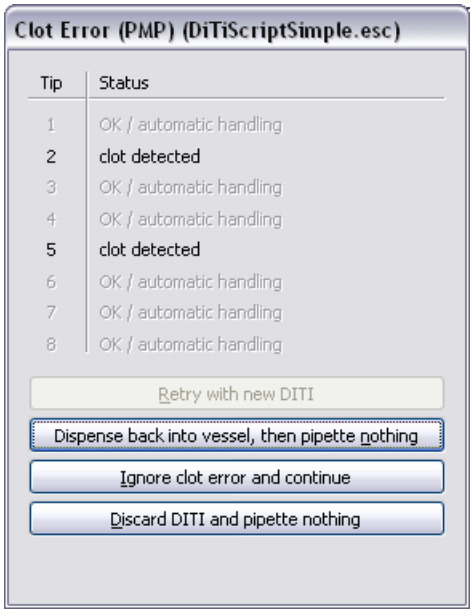

Fig. 18-3 *Clot Error (PMP) dialog box*

The buttons in the dialog box are as follows. The actions described only apply to the affected tip positions - if the pipetting script is allowed to continue, the other tips will be handled in the normal way.

Retry with new DITI

This option is currently not available for PMP.

Dispense back into vessel, then pipette nothing

If you click this button, Freedom EVOware will dispense the aspirated volume back into the vessel and will not use the affected tip(s) until the next Get DITIs operation.

The affected wells won't be reported any more in the output files.

Ignore clot error and continue

If you click this button, Freedom EVOware will continue with the pipetting script and report "clot error ignored" in the output file(s).

Discard DITI and pipette nothing

If you click this button, Freedom EVOware will discard the affected DITI(s) and will not use these tip positions until the next Get DITIs operation.

The following LiHa movements are made in this case when discarding the DITIs: The LiHa moves in the Y direction to behind the worktable and then in the X direction along the back of the worktable to the grid position of the DITI waste. It then moves forward to the DITI waste and discards the DITI. It then moves back to the original pipetting position by retracing the same path.

The affected wells won't be reported any more in the output files.

PMP errors are shown in the report file of the Export Data command (see Tab. 15-8, 🗎 15-54). See also 17.6.4 "PMP Error and Success Messages", 🗎 17-22 and 10.2.1 "LiHa Aspirate Parameters (Fixed Tips and DiTis)", 🗎 10-7, *On PMP Clot Error*.

18.1.4 PMP Instrument Error

The following dialog box is shown if the PMP (Pressure Monitored Pipetting) firmware reports "pressure out of range" during pipetting. The dilutor is then stopped to avoid damage to the PMP pressure sensor.

The under-pressure threshold is set so that Clot Error (PMP) will normally trigger before "pressure out of range", hence avoiding the need for re-initialization and allowing error handling options instead (see 18.1.3 "Clot Error (PMP)", 🗎 18-3).

PMP is only available for LiHa DITI tips. The dialog box shows the respective tip or tips and the tip status:

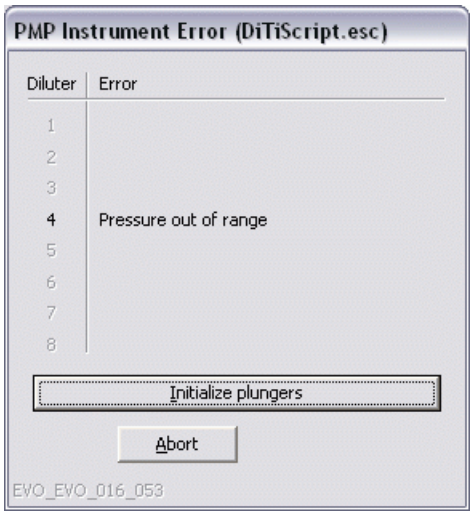

Fig. 18-4 *PMP Instrument Error dialog box*

The buttons in the dialog box are as follows. The actions described only apply to the affected tip positions.

Initialize plungers

If you click this button, Freedom EVOware will discard the affected DITI(s) and will not use these tip positions until the next Get DITIs operation. In addition, the respective plungers of the PMP option will be initialized.

The following LiHa movements are made in this case when discarding the DITIs: The LiHa moves in the Y direction to behind the worktable and then in the X direction along the back of the worktable to the grid position of the DITI waste. It then moves forward to the DITI waste and discards the DITI. It then moves back to the original pipetting position by retracing the same path.

The affected wells will be flagged with “Diluter Error” in the output files.

Abort

Click Abort if you want to stop the pipetting script.

PMP errors are shown in the report file of the Export Data command (see Tab. 15-8, 15-54). See also 17.6.4 “PMP Error and Success Messages”, 17-22.

18.1.5 Liquid Arrival Check Error

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. Freedom EVOware automatically calculates the liquid volume from the weight difference and compares the results with the volume specified in the pipetting command. The following dialog box is shown if the two values differ by more than the maximum volume deviation which is specified in the liquid class which was used for pipetting:

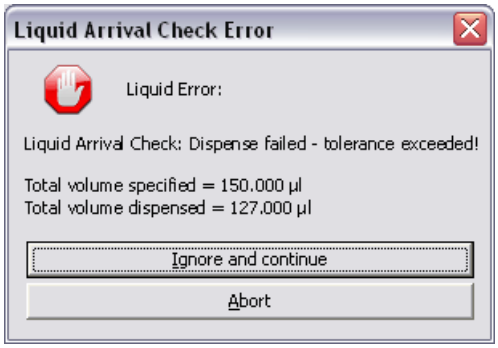
Liquid Arrival Check Error
Liquid Error:
Liquid Arrival Check: Dispense failed - tolerance exceeded!
Total volume specified = 150.000 µl
Total volume dispensed = 127.000 µl
Ignore and continue
Abort

Fig. 18-5 *Liquid Arrival Check error*

The same dialog box is also used to display technical errors from the LAC hardware.
The buttons in the dialog box are as follows:

Ignore and continue

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Abort

Click Abort if you want to stop the pipetting script.

18.1.6 Volume Monitoring Error (Diluter Overflow)

The following dialog box is shown when the liquid amount you want to aspirate exceeds the diluter capacity:

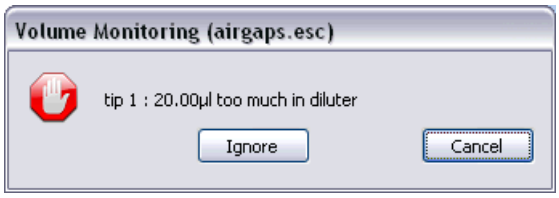

Fig. 18-6 *Volume Monitoring dialog box*

The buttons in the dialog box are as follows:

Cancel

Click Cancel if you want to stop the pipetting script.

Ignore

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Note: *Check the pipetting script or adapt the liquid class with regard to air gaps and excess/conditioning volume.*

18.1.7 Diluter Error

The following dialog box is shown when the pipetting instrument reports a diluter error. The dialog box shows the respective diluter or diluters and the error(s):

Fig. 18-7 *Diluter Error dialog box*

The buttons in the dialog box are as follows:

Initialise

If you click this button, Freedom EVOware will move the LiHa above the left-most waste position and will try to initialize the diluter(s). If an error occurs again, this dialog box will be displayed again.

With Standard Tips: If the initialization is successful, the pipetting script will continue, but Freedom EVOware will not use the affected tips until the next Wash Tips operation.

With DITIs: If you click this button, Freedom EVOware will discard the affected DITI(s) and will not use these tip positions until the next Get DITIs operation.

In both cases, the affected wells will be flagged with “Diluter Error” in the output files.

Deactivate

Click this button to switch off the affected diluter. It will not used any more for pipetting and the tip position will be marked as “broken” in the configuration of the LiHa.

Notes on specific error messages

Plunger Overload

Too much force is needed to move the plunger.

Possible causes are:

– The tip is blocked.
– The pipes are blocked.
– The 3-way valve is faulty.
– The plunger or plunger cap has jammed.

Invalid Operand

Possible causes are:

– Aspirate or dispense speed has been configured too high.

- Check the log file to see which liquid class has been used. Make sure that the single pipetting and multi-pipetting is configured appropriately.
- The script has tried to aspirate a liquid volume which exceeds the diluter capacity. The total aspirated volume also includes the airgaps.

18.1.8 Error Fetching DITIs

The following dialog box is shown if a DITI was not fetched correctly (as reported by the electrical DITI sensors in the pipetting head). A common cause of this error is a missing DITI in the DITI rack. The dialog box shows the respective tip or tips and the tip status:

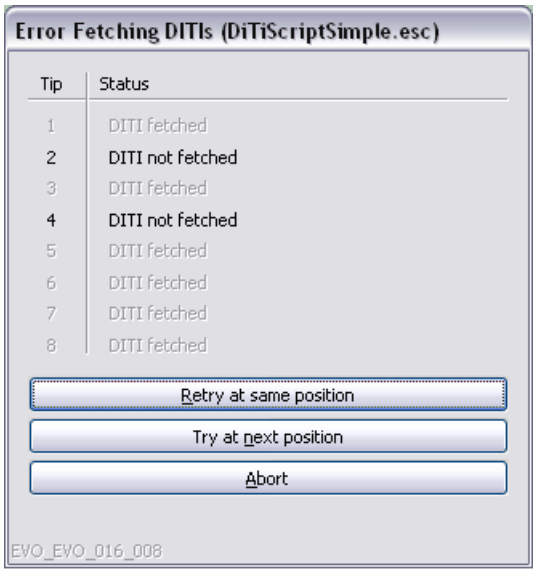

Fig. 18-8 *Error Fetching DITIs dialog box*

The buttons in the dialog box are as follows:

Retry at same position

If you click this button, Freedom EVOware will try to fetch the affected DITI(s) again.

Try at next position

If you click this button, Freedom EVOware will try to fetch DITIs for the affected position(s) at the next available location(s) in the DITI rack.

Abort

Click Abort if you want to stop the pipetting script.

18.1.9 Error Mounting DITIs

The following dialog box is shown if a DITI was fetched (as reported by the electrical DITI sensors in the pipetting head) but was not mounted correctly (as reported by the force feedback sensors). A common cause of this error is inaccurate or incorrect teaching of the DITI labware.
The dialog box shows the respective tip or tips and the tip status:

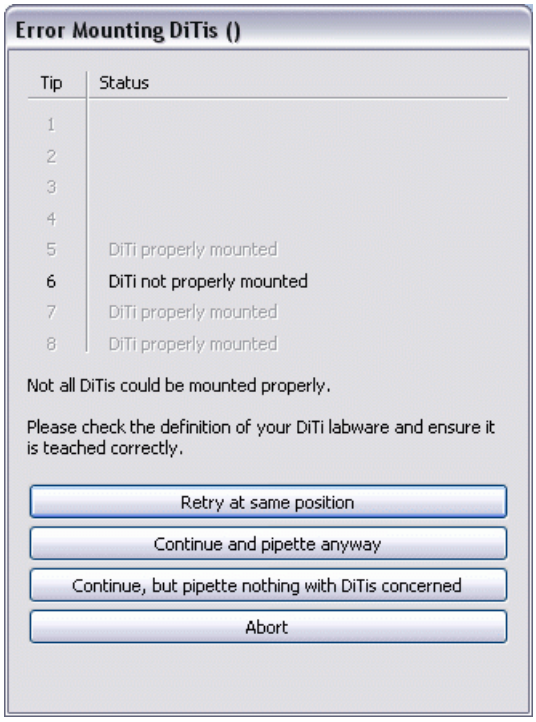

Fig. 18-9 *Error Mounting DITIs dialog box*

The buttons in the dialog box are as follows:

Retry at same position

If you click this button, Freedom EVOware will try to fetch the affected DITI(s) again. Before you do this, make sure that DITIs are available at all of the required well positions.

Continue and pipette anyway

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script.

Choose this option if visual inspection shows that the DITIs are correctly mounted and you decide that it is safe to continue with the script.

Continue, but pipette nothing with DITIs concerned

If you click this button, Freedom EVOware will continue with the pipetting script, but will not use the affected tip(s) until the next Get DITIs operation. The affected tip(s) will move upwards as far as possible to be out of the way of other objects.

Choose this option to avoid the risk of loosing the DITIs during pipetting if they are not tightly or correctly attached to the DITI adapters.

The affected wells won't be reported any more in the output files.

Abort

Click Abort if you want to stop the pipetting script.

18.1.10 Lost DITI Error

The following dialog box is shown if a DITI has been lost directly before or after a pipetting command (as reported by the electrical DITI sensors in the pipetting head). The dialog box shows the respective tip or tips and the tip status:

Fig. 18-10 *Lost DITI Error dialog box*

The buttons in the dialog box are as follows:

Continue, but pipette nothing with lost DITI

If you click this button, Freedom EVOware will continue with the pipetting script, but will not use the affected tip(s) until the next Get DITIs operation. The affected tip(s) will move upwards as far as possible to be out of the way of other objects.

The affected wells won't be reported any more in the output files.

Abort

Click Abort if you want to stop the pipetting script.

18.1.11 DITI Already Mounted Error

The following dialog box is shown if a DITI is detected on the DITI adapter directly before a Get DITI or Pickup DITI command is executed. The dialog box shows the respective tip or tips and the tip status:

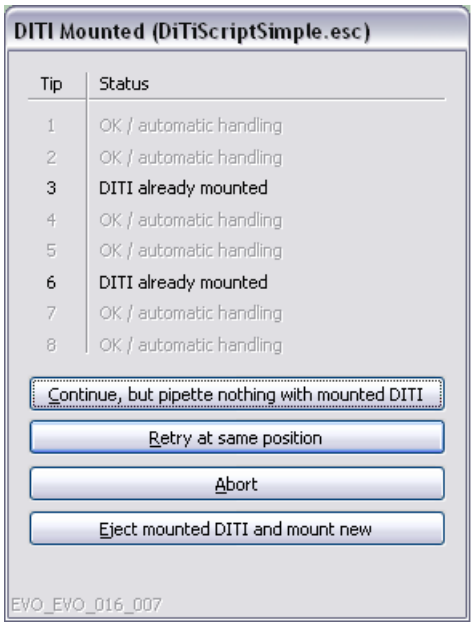

Fig. 18-11 *DITI Already Mounted error dialog box*

The buttons in the dialog box are as follows:

Continue, but pipette nothing with mounted DITI

If you click this button, Freedom EVOware will continue with the pipetting script, but will not use the affected tip(s) until the next Get DITIs operation. The affected tip(s) will move upwards as far as possible to be out of the way of other objects.

The affected wells won't be reported any more in the output files.

Retry at same position

If you click this button, Freedom EVOware will try again to get or pick up a DITI after checking again whether a DITI is already mounted.

Abort

Click Abort if you want to stop the pipetting script.

Eject mounted DITI and mount new

If you click this button, Freedom EVOware will eject the DITI which is mounted and get another DITI for this tip position.

18.1.12 Error Reading Barcodes

The following dialog box is shown if the pipetting instrument reports an error when scanning a carrier, labware or tube barcode with the PosID barcode scanner (the example below shows a labware barcode error). The dialog box shows the error which was returned:

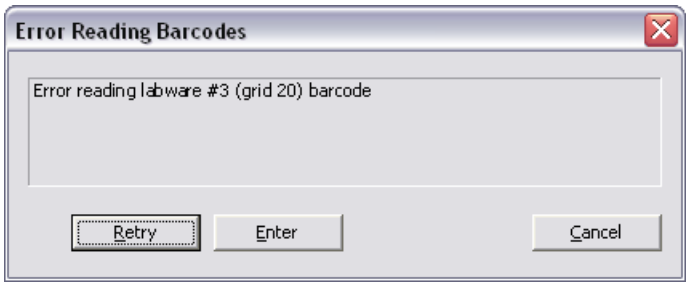

Fig. 18-12 *Error Reading Barcodes dialog box*

The buttons in the dialog box are as follows:

Retry

Click this button to scan the barcode again.

Enter

If you click this button, the *Enter Barcode* dialog box is displayed to let you enter the barcode manually.

Cancel

Click Cancel if you want to stop the pipetting script.

Notes on specific error messages

Unexpected carrier barcode on grid {}

The carrier code of the scanned barcode does not match the carrier code of the carrier in the Worktable Editor (i.e. the incorrect carrier type is specified in Freedom EVOware or has been loaded on the worktable). All standard Tecan carriers have a unique carrier code (the carrier code is shown in the first three digits of the barcode; it is configured in the carrier definition).

18.1.13 Carrier Barcode Error

The following dialog box is shown if the pipetting instrument reports an error when scanning a carrier barcode with the PosID-3 barcode scanner. The dialog box shows the error which was returned:

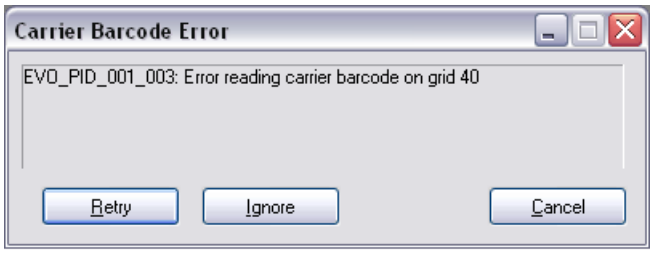

Fig. 18-13 *Carrier Barcode Error dialog box*

The buttons in the dialog box are as follows:

Retry

Click this button to scan the barcode again.

Ignore

Click this button to ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Cancel

Click Cancel if you want to stop the pipetting script.

Notes on specific error messages

Carrier Barcode Error: Unexpected carrier barcode on grid {}

The carrier code of the scanned barcode does not match the carrier code of the carrier in the Worktable Editor (i.e. the incorrect carrier type is specified in Freedom EVOware or has been loaded on the worktable). All standard Tecan carriers have a unique carrier code (the carrier code is shown in the first three digits of the barcode; it is configured in the carrier definition).

Error reading carrier barcode on grid {}

Each carrier or tube rack is fitted with two barcodes. This is done to enhance scanning accuracy. The two barcodes only differ in the separator character between the carrier code and the barcode (“\” or “/”). This error occurs if the the separator characters are incorrect.

18.1.14 Barcode Error

The following dialog box is shown if the pipetting instrument reports an error when scanning a labware or tube barcode with the PosID-3 barcode scanner (the example below shows a labware barcode error). The dialog box shows the error which was returned:

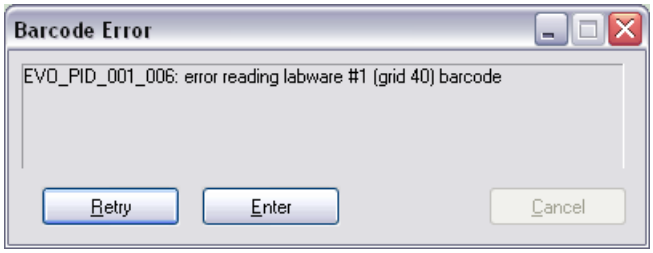

Fig. 18-14 *Barcode Error dialog box*

The buttons in the dialog box are as follows:

Retry

Click this button to scan the barcode again.

Enter

If you click this button, the *Enter Barcode* dialog box is displayed to let you enter the barcode manually.

Cancel

Click Cancel if you want to stop the pipetting script.

Notes on specific error messages

Barcode Error: Mismatching barcode for position grid ... site ...

The barcodes of all of the labware on the worktable must be unique. This error occurs if the same barcode has been scanned on more than one tube or labware item.

18.1.15 Labware or Tube Barcode Error

The barcodes of all of the labware on the worktable must be unique. This error occurs if the same barcode has been scanned on more than one tube or labware item.

The duplicate barcode has either been read by a barcode scanner (e.g. PosID, PosID-3 or Symbol barcode scanner) or has resulted from an incorrect or inappropriate assigment of a barcode variable in a pipetting script (e.g. using the Set Variable command).

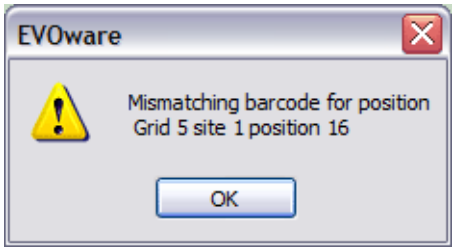

Fig. 18-15 *Barcode Error dialog box*

The buttons in the dialog box are as follows:

OK

Click this button to continue with the script.

18.1.16 Enter Barcode

The following dialog box is shown if an error is detected when scanning a labware barcode with the PosID or PosID-3 barcode scanner and the operator clicks *Enter* in the *Barcode Error* dialog box:

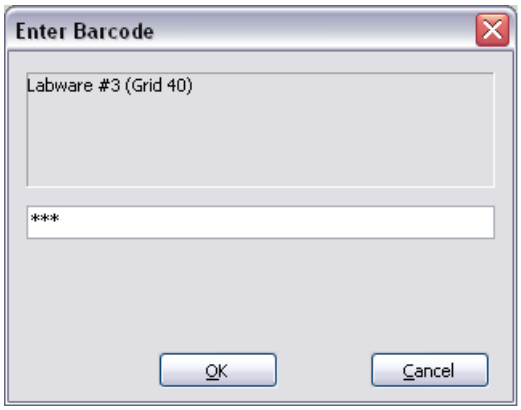

Fig. 18-16 *Enter Barcode dialog box*

The buttons in the dialog box are as follows:

OK

Click OK after you have entered the correct barcode in the field provided.

Cancel

Click Cancel if you want to stop the pipetting script.

This dialog box is also shown if your script contains a PosID command and you are running Freedom EVOware in offline mode. In this case, the dialog box will be shown with a default barcode.

For the PosID, the default barcode for labware is the grid position followed by an underscore (_) and the site number. The default barcode for tubes is the grid position followed by an underscore (_) and the tube number.

18.1.17 Enter Barcode (Double Blind Entry)

The following dialog box is shown if an error is detected when scanning a labware barcode with the PosID-3 barcode scanner and the operator clicks *Enter* in the *Barcode Error* dialog box. The *Double Blind Entry* feature has been activated in the configuration of the PosID-3. With *Double Blind Entry*, you are prompted to enter the missing barcode twice.

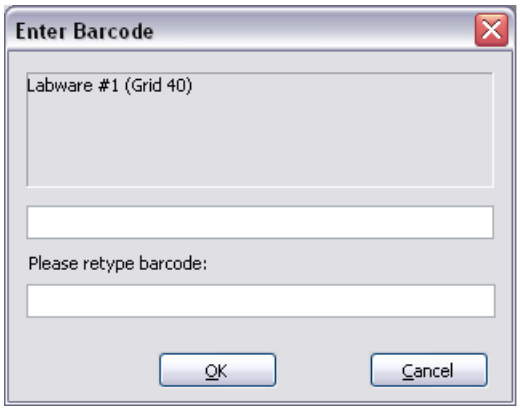

Fig. 18-17 *Enter Barcode dialog box*

The buttons in the dialog box are as follows:

OK

Click OK after you have entered the correct barcode in both of the fields which are provided.

Cancel

Click Cancel if you want to stop the pipetting script.

18.1.18 Instrument Error

The following dialog box is shown if the pipetting instrument reports an error that is not handled automatically by Freedom EVOware. The dialog box shows the error number, a brief description of the error, and the device (hardware component or option) and firmware command that caused the error.

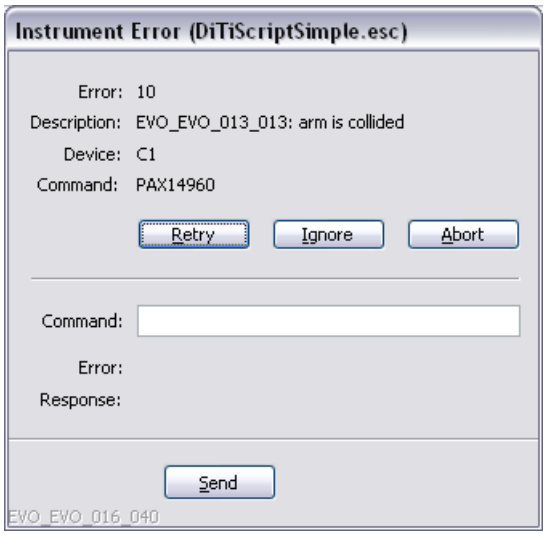

Fig. 18-18 *Instrument Error dialog box*

The buttons in the dialog box are as follows (not all buttons available at all times, refer to the note below):

Retry

Click this button to re-send the firmware command to the pipetting instrument. This option is not allowed for users with the user level Operator. If you click the Retry button, you will be prompted to log in again as an Application Specialist or Freedom EVOware Administrator [1)]. You will not be able to proceed with Retry if you do not have the appropriate user name and password.

Ignore

Click this button to ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors. This option is not allowed for users with the user level Operator. If you click the Retry button, you will be prompted to log in again as an Application Specialist or Freedom EVOware Administrator [1)]. You will not be able to proceed with Ignore if you do not have the appropriate user name and password.

Abort

If you click this button, the current command is completed without sending any more firmware commands (e.g. movement commands) to the pipetting instrument and the script is stopped. Freedom EVOware then switches to offline mode. To cancel offline mode and resume normal pipetting, choose *Switch to real mode* in the Execute menu or restart Freedom EVOware.

1) *Or a Power User with the rights "Start running pipetting scripts at a specified line number". See 8.3.3.3 "Groups Tab", 8-20.*

Send

This button is used to send a firmware command directly to the pipetting instrument and is only intended for specialists. Specify the required command in the *Command* field and click *Send*. For example, “A1RPZ0” returns the current Z position of each of the LiHa tips. Refer to the firmware documentation for the device for a complete list of firmware commands. Firmware commands are nearly always written uppercase.

Error: All firmware commands terminate with an error code. After clicking the *Send* button, the error code is shown in this (protected) field. The error code is 0 if the command was executed with no errors.

Response: Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. After clicking the *Send* button, the return parameters are shown in this (protected) field.

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

Note: *The buttons* ***Retry****,* ***Ignore*** *and* ***Send*** *are not available (inactive) if you are logged in to Freedom EVOware as an operator. In this case, only the* ***Abort*** *button is available.*

18.1.19 Doorlock Error

The following dialog box is shown if an error is reported by the doorlock hardware when locking or unlocking the doorlocks. When locking the doorlocks, a doorlock error normally indicates that the respective safety door has not been closed properly, but it can also be caused by a mechanical or electrical malfunction of the doorlock mechanism. The dialog box shows which doorlock has reported the error.

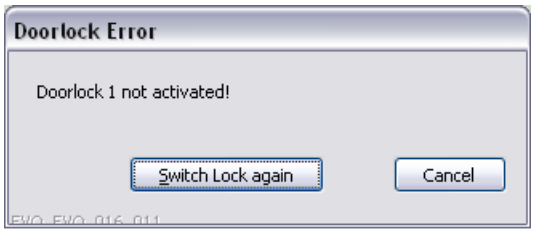

Fig. 18-19 *Doorlock Error dialog box*

The buttons in the dialog box are as follows:

Switch Lock again

Click this button to try to lock or unlock the doorlocks in the doorlock group again. The Doorlock Error dialog box will displayed again if the operation is not successful.

Cancel

Click this button to cancel the pipetting script.

WARNING

Risk of injury to operating personnel

- Be aware of the safety risk if the doors are not properly locked. If in doubt, cancel the script and contact the maintenance personnel before using the pipetting instrument again.

18.1.20 Grip Error

The following dialog box is shown if the RoMa could not grip a labware item or if the PnP could not grip a tube:

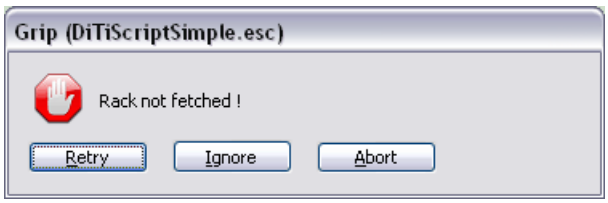

Fig. 18-20 *Grip Error dialog box*

The buttons in the dialog box are as follows:

Retry

If you click this button, Freedom EVOware will try to grip the labware item or tube again.

Ignore

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Abort

Click Abort if you want to stop the pipetting script.

18.1.21 Te-Stack Errors

The following dialog box is shown if the Te-Stack (stand-alone stacker) or the Te-Stack Te-MO reports an error.

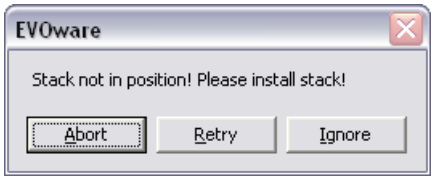

Fig. 18-21 *-Te-Stack Errors message box*

The following errors can be displayed in this dialog box:

Stack not in position

You must insert a stack into the stacker (error from Te-Stack or Te-Stack Te-MO).

Stack empty

The stack is empty, you must put labware into the stack (error from Te-Stack or Te-Stack Te-MO).

Carrier position not empty

The transfer position is already occupied, you must remove the labware from the transfer position (error from Te-Stack only).

Carrier position empty

The transfer position is empty, you must place labware onto the carrier at the transfer position position (error from Te-Stack only).

No barcode detected

The labware barcode could not be scanned, e.g. damaged barcode, or wrong barcode format (error from Te-Stack only). You should check the barcode and/or the scanner.

18.1.21.1 Other Te-Stack Errors

The following dialog box is shown if the Te-Stack reports an error which is not listed in 18.1.21 “Te-Stack Errors”, 18-20. The dialog box shows the pipetting instrument error number and a brief description of the error, such as “Te-Stack collided with an obstacle” or “time-out error”.

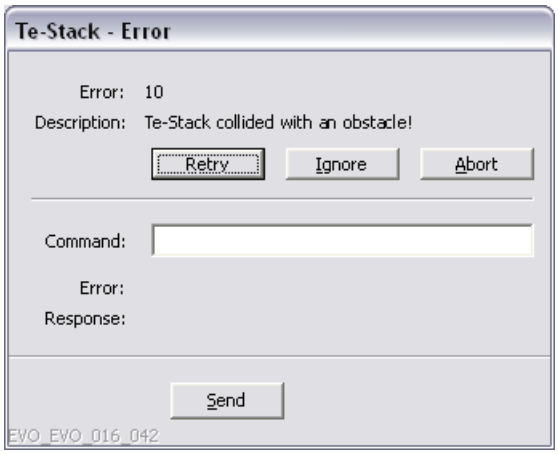

Fig. 18-22 *Te-Stack Error dialog box*

Note: *The pipetting instrument error number is not the same as the Freedom EVOware error message ID.*

The buttons in the dialog box are as follows:

Retry

If you click this button, Freedom EVOware will resend the command to the pipetting instrument.

Ignore

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Abort

Click Abort if you want to stop the pipetting script.

Send

This button lets you send a firmware command directly to the instrument and is only intended for specialists. Specify the required command in the *Command* field and click *Send*. For example, “A1RPZ0” returns the current Z position of each of the LiHa tips. See the respective instrument manual for a list of firmware commands. Firmware commands are nearly always written uppercase.

Error: All firmware commands terminate with an error code. After clicking the *Send* button, the error code is shown in this (protected) field. The error code is 0 if the command was executed with no errors.

Answer: Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. After clicking the *Send* button, the return parameters are shown in this (protected) field.

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

18.1.22 Te-MO DITI Error

The following dialog box is shown if a Te-MO DITI could not be fetched:

Fig. 18-23 *Te-MO DITI error dialog box*

A similar dialog box is shown if the Te-MO tipblock could not be fetched.

The buttons in the dialog box are as follows:

Retry

If you click this button, Freedom EVOware will try to fetch the Te-MO DITI or Te-MO tipblock again.

Ignore and continue

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Abort

Click Abort if you want to stop the pipetting script.

18.1.23 WRC/Te-MO Error

The Wash & Refill Center is a supporting device for the Te-MO which is connected to the Te-MO wash block through tubing. The following dialog box is shown if the Te-MO or the WRC reports an error, with the exception of the errors WRC empty and WRC overflow, which are described in 18.1.24 “WRC Errors”, 18-24.

The dialog box shows the pipetting instrument error number and a brief description of the error, such as “Waste bottle 1 empty’:

Fig. 18-24 *WRC/Te-MO Error dialog box*

Note: *The pipetting instrument error number is not the same as the Freedom EVOware error message ID.*

The buttons in the dialog box are as follows:

Retry

If you click this button, Freedom EVOware will resend the command to the pipetting instrument.

Ignore

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Abort

If you click this button, the current command is completed without sending any more firmware commands (e.g. movement commands) to the pipetting instrument and the script is stopped. Freedom EVOware then switches to offline mode. To cancel offline mode and resume normal pipetting, choose *Switch to real mode* in the Execute menu or restart Freedom EVOware.

Send

This button lets you send a firmware command directly to the instrument and is only intended for specialists. Specify the required command in the *Command* field and click *Send*. For example, “A1RPZ0” returns the current Z position of each of the LiHa tips. See the respective instrument manual for a list of firmware commands. Firmware commands are nearly always written uppercase.

Error: All firmware commands terminate with an error code. After clicking the *Send* button, the error code is shown in this (protected) field. The error code is 0 if the command was executed with no errors.

Answer: Some firmware commands terminate with one or more return parameters (numeric values) separated by commas. After clicking the *Send* button, the return parameters are shown in this (protected) field.

WARNING

Risk of injury to operating personnel or damage to the equipment

- Take care when sending firmware commands. Sending the wrong commands can damage the instrument or objects in its workspace, hurt yourself or other people.

18.1.24 WRC Errors

The Wash & Refill Center is a supporting device for the Te-MO which is connected to the Te-MO wash block through tubing. The following two errors can be output by the Wash and Refill Center. See 18.1.23 “WRC/Te-MO Error”, 18-23 for information on additional Te-MO WRC errors.

18.1.24.1 WRC Empty Error

The following dialog box is shown during a Te-MO wash cycle if the wash block of the Wash & Refill Center (WRC) is empty. You will be prompted to refill the wash block:

Fig. 18-25 *Wash & Refill Center error dialog box*

The buttons in the dialog box are as follows:

OK

The pumps will be started and will continue to run until the liquid reaches the specified upper level or the user stops the pumps.

Ignore

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Abort

Click Abort if you want to stop the pipetting script.

18.1.24.2 WRC Overflow Error

The following dialog box is shown during a Te-MO wash cycle if the wash block of the Wash & Refill Center (WRC) is full. You will be prompted to empty the wash block:

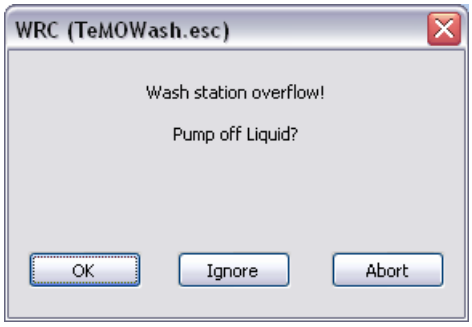

Fig. 18-26 *Wash & Refill Center error dialog box*

The buttons in the dialog box are as follows:

OK

The vacuum pump will be started and will continue to run until the liquid reaches the specified lower level or the user stops the pump.

Ignore

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Abort

Click Abort if you want to stop the pipetting script.

18.1.25 WinWash Liquid Error

WinWash Plus is an MS Windows-based program which is supplied with Tecan Plate Washers. It functions as the software interface between the PW384 driver in Freedom EVOware and the hardware of the PW384 Plate Washer. WinWash Plus is not used by the PW384GP driver.

Freedom EVOware displays the following dialog box when executing a script containing WinWash commands if one or more of the bottles is empty:

Fig. 18-27 *WinWash Liquid Error dialog box*

The buttons in the dialog box are as follows:

OK

If you click this button, Freedom EVOware will resend the command to the pipetting instrument.

Ignore

If you click this button, Freedom EVOware will ignore the error and continue with the pipetting script. Please be careful with this option. Ignoring errors can lead to further errors.

Cancel

The pipetting script is stopped.

18.1.25.1 Other WinWash Errors

The following general errors can also occur:

COM-Library could not be initialized!

Possible reason: WinWash Plus is not installed.

WinWash server could not be created!

Possible reason: WinWash Plus is not installed.

The washer could not be connected!

Possible reason: Washer not switched on or washer not connected to the PC.

The following error can occur when defining the WinWash command in your script:

Error during wash program selection!

Internal WinWash error. A problem occurred when choosing the WinWash program.

18.1.26 Vacuum Waste Container Error

The following dialog box is shown by the Te-VacS option if the waste container is full:

Fig. 18-28 *Vacuum Waste Container error dialog box*

The buttons in the dialog box are as follows:

Ignore

To continue with the pipetting script, empty the waste container and click the *Ignore* button.

Abort

Click Abort if you want to stop the pipetting script.

18.1.27 Liquid Error (PW384)

The liquid error dialog box is shown if the waste bottle is not emptied after the configured number of warnings. The liquid error dialog box is also shown if the wash liquid bottle is not re-filled after the configured number of warnings.

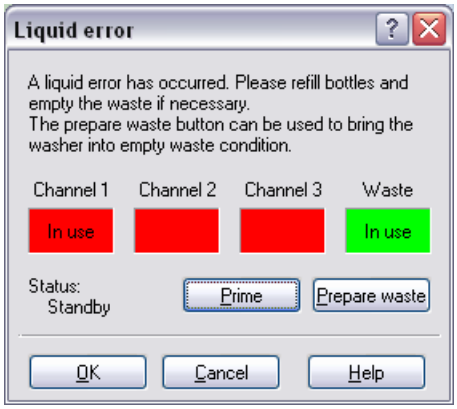

Fig. 18-29 *Liquid error dialog box of the PW384 Plate Washer driver*

The liquid levels of the wash liquid channel and the waste bottle are checked before each wash step. Warning levels and liquid detection are configured in the settings for the PW384 driver.

In the above example dialog box, all three liquid bottles are empty. The error dialog has been shown because the channel 1 liquid bottle is empty (the other two channels are not used by the wash command so their empty status is ignored). The waste bottle is not full.

The buttons in the dialog box are as follows:

Prime

If one of the liquid bottles is empty, the “Channel” icon will be red. In this case, refill the bottle and click the *Prime* button to execute the washer’s priming procedure. The *Prime* button is not available until the bottle has been refilled.

Note: The *Prime* button is not available if you have clicked the *Prepare Waste* button.

Prepare Waste

If the waste bottle is full, the “Waste” icon will be red. In this case, click the *Prepare Waste* button to collapse the vacuum in the waste bottle to allow it to be emptied. When you have emptied the waste bottle, the “Waste” icon will turn to green and the *Prepare Waste* button will be replaced by a *Stop* button. Click the *Stop* button to activate the vacuum pump again.

18.1.28 Liquid Error (PW384GP)

The liquid error dialog box is shown if the waste bottle is not emptied after the configured number of warnings. The liquid error dialog box is also shown if the wash liquid bottle is not re-filled after the configured number of warnings.

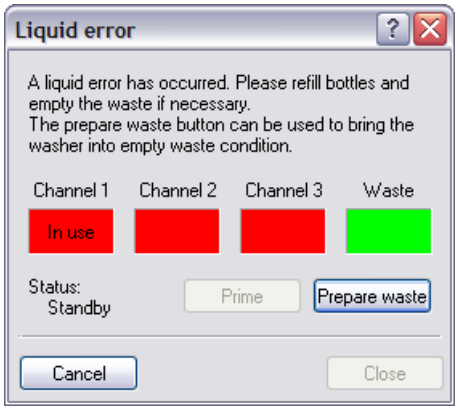

Fig. 18-30 *Liquid error dialog box of the PW384GP Plate Washer driver*

The liquid levels of the wash liquid channel and the waste bottle are checked before each wash step. Warning levels and liquid detection are configured in the settings for the PW384GP driver.

In the above example dialog box, all three liquid bottles are empty. The error dialog has been shown because the channel 1 liquid bottle is empty (the other two channels are not used by the wash command so their empty status is ignored). The waste bottle is not full.

The buttons in the dialog box are as follows:

Prime

If one of the liquid bottles is empty, the “Channel” icon will be red. In this case, refill the bottle and click the *Prime* button to execute the washer’s priming procedure. The *Prime* button is not available until the bottle has been refilled.

Note: The *Prime* button is not available if you have clicked the *Prepare Waste* button.

Prepare Waste

If the waste bottle is full, the “Waste” icon will be red. In this case, click the *Prepare Waste* button to collapse the vacuum in the waste bottle to allow it to be emptied. When you have emptied the waste bottle, the “Waste” icon will turn to green and the *Prepare Waste* button will be replaced by a *Stop* button. Click the *Stop* button to activate the vacuum pump again.

Close

Click this button to close the dialog box. The *Close* button is only active if the error condition has been resolved by following the procedure described above.

18.2 Editing Messages in Message Boxes

Messages in Freedom EVOware which are displayed in a message box use a standard layout as follows:

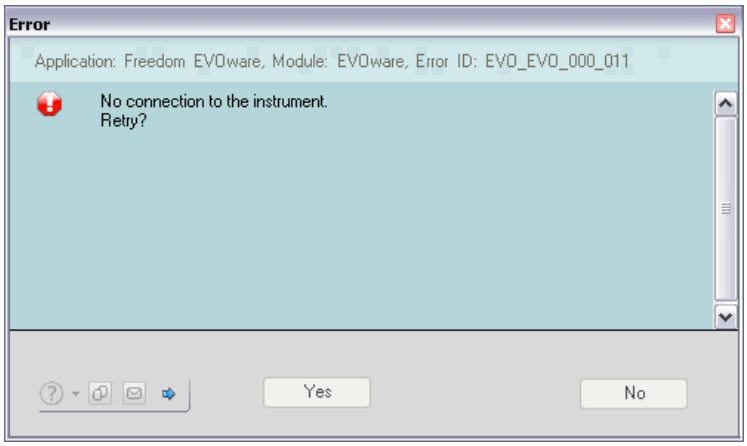

Fig. 18-31 *Freedom EVOware message box - Normal view*

In the case of error messages, the Error ID is shown at the top of the message box. For a list of Error IDs see 18.3 “List of Error Messages”, 18-32.

If required, you can add more information to each message, such as a reason for the message and a possible solution. The user-defined texts are saved in Freedom EVOware and appear each time the message is displayed. For example, the additional information can refer to procedures which are specific to the laboratory’s standard workflow.

Note: *Choose Error History in the Help menu to see a list of the last 20 information or error messages which were displayed while using Freedom EVOware. Double-click on an entry in the list to see the details of the message.*

- *If you open the message from the Error History menu item, the buttons are the bottom of the message are inctivate (grey) because the script or process is no longer running (see Yes and No buttons in above screen shot).*

To edit the message texts, click in the message box to switch to edit view:

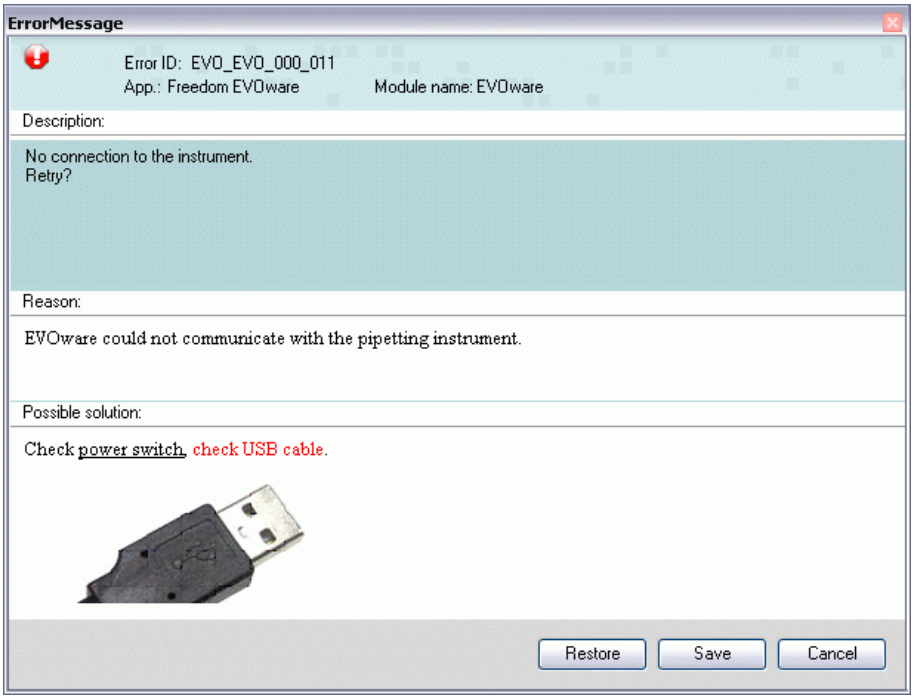

Fig. 18-32 *Freedom EVOware message box - Edit view*

Click in the *Reason* or *Possible solution* fields to add your own texts. Use the keyboard shortcut Ctrl+V to paste in text which you have copied to the clipboard. You can also paste in bitmap graphics such as screenshots. The paste-from-clipboard function also supports text which has been formatted using Microsoft RTF (Rich Text Format) formatting codes. An easy way to include RTF formatting in the message such as bold, coloured or underlined text, is to pre-format the text in Microsoft Word and to transfer the text from Word to the message box using cut and paste.

Click Save to save your changes. Click Restore to restore the message text to the standard text which was shown when Freedom EVOware was first installed. Click Cancel to discard your changes. Click Close to return to the normal view of the message box.

After editing, the error message shown in Fig. 18-31, 18-29 will appear in future as follows:

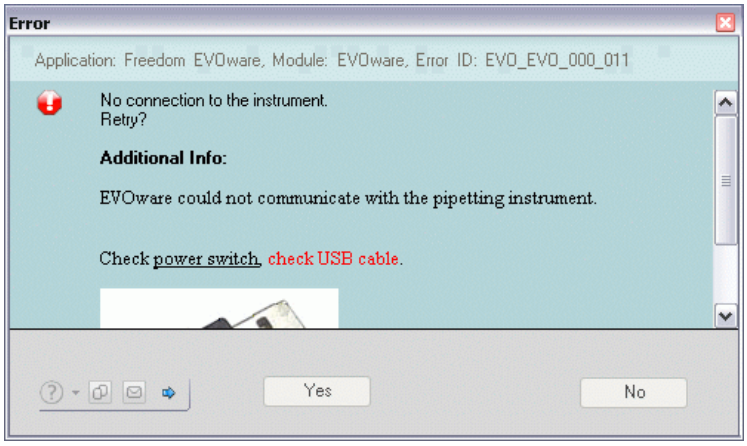

Fig. 18-33 *Freedom EVOware message box - Standard view with user-defined texts*

The user-defined texts are shared between all of the Freedom EVOware scripts and/or processes which could display this message. Accordingly, you should choose texts which are generally applicable to the message - they should not refer to a specific situation in a specific script or process.

Other buttons in the message box

Click in the message box to copy the message text to the clipboard.
Click in the message box to send a copy of the message via eMail. The message will be sent via MAPI or SMTP using the settings configured in Freedom EVOware for the notifications feature (Configuration Tool > General tab > Notifications section). If an email account has not (yet) been configured in Freedom EVOware, the eMail will be sent instead using the default eMail client which is installed on the PC (if available).

18.3 List of Error Messages

The table below lists all messages from Freedom EVOware which are visible to the user.

Runtime error messages from Freedom EVOware are recorded in log files and can also be viewed in the LogViewer tool (see A.1 “Overview of the Log Files”, A-1 and A.10 “LogViewer Tool”, A-72).

Error Messages

In case of error messages, this gives instructions on how to handle the error, if applicable.

If there is no cause or corrective measure associated with the message (e.g. if the message is for information purposes only), the table cell is marked with n.a. for “not applicable”.

Variables

If the message text shown in the table contains variables, such as numbers or names, the variable is shown below in angle brackets, e.g. <name>.

The text in the Freedom EVOware message or error message will show the corresponding value of the variable.

Tab. 18-1 *List of error messages*

Error ID	Message Text	Reason	Corrective Measure
Carousel			
EVO_BCC_000_000	Module successfully executed its COM registration.	n.a.	n.a.
EVO_BCC_000_001	Module is unable to prepare its COM registration.	• Call name is missing • No right to write to registry	• Check driver INI file • Check user rights
EVO_BCC_000_002	An unhandled exception has occurred.	Exception occurred during registration	• Check INI file • Check user rights
EVO_BCC_001_000	No communication to device available. Device will be simulated.	COM port could not be opened	Check device configuration
EVO_BCC_002_000	Error <error number> while initializing Communication!	Windows responded with an error while opening COM	Check configuration
EVO_BCC_003_000	Could not connect to Message Server.	Could not connect to MCS	Check registration of MCS
EVO_BCC_003_001	Message thread could not be stopped.	(in debug mode only)	n.a.
EVO_BCC_004_000	General error during database registration!	Problem during connection to database	• Restart EVOware • Restore backup • Reinstall EVOware
EVO_BCC_004_001	Scheduler could not be reached!	Could not connect the scheduler	• Restart EVOware • Reinstall EVOware

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_BCC_005_000	Cannot read variables from database.	Error when reading variables from the database	• Restart EVOware • Restore backup • Reinstall EVOware
EVO_BCC_005_001	Cannot read instances from database.	Error when reading instances from the database	• Restart EVOware • Restore backup • Reinstall EVOware
EVO_BCC_006_000	Initialisation was successful	n.a.	n.a.
EVO_BCC_006_001	Initialisation was NOT successful	An error was reported from the carousel	• Re-initialize • Restart EVOware • Restart instrument and EVOware
EVO_BCC_006_002	ERROR: EndAccess command expected!	EndAccess command missing	Add EndAccess command
EVO_BCC_006_003	ERROR: ReturnPlateByBarcode command expected!	ReturnPlate command missing	Add ReturnPlate command
EVO_BCC_006_004	Timeout occured while synchronizing with tool thread	Timeout	Check log files for more information
EVO_BCC_006_005	Execution was successful	n.a.	n.a.
EVO_BCC_006_006	Error occured during execution	See error message	Check log files
EVO_BCC_006_007	Carousel timed out.	An action took too long	• Restart process • Restart EVOware
EVO_BCC_006_008	Emergency Stop	n.a.	n.a.
EVO_BCC_007_000	Generated ID <name>	n.a.	n.a.
EVO_BCC_007_001	Barcode <name>	n.a.	n.a.
Carousel NT			
EVO_CNT_000_000	Error initializing device.	• Device initialization failed • Instrument or device switched off • Incorrect address settings • Bad connections to device	• Check if device is powered • Check address settings • Check connections
EVO_CNT_000_001	Execution was successful	n.a.	n.a.
EVO_CNT_000_002	Error occurred during execution	See error message	Check log files
EVO_CNT_000_003	ERROR: Barcode File Index is greater than number of lines in barcode file!	n.a.	Check number of lines in barcode file, check the barcode index

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_CNT_000_004	Cannot find position for specified barcode: <barcode>	Plate with specified barcode not known to the carousel.	• Check barcode • Refer to the description of the commands PresentPlateByBC and ReturnPlateByBC
EVO_CNT_000_005	Makro_ReadPlatesInCartridge: A database error was reported by function GetAllPlatesInHotel():	Internal error	Contact your local service organization
EVO_CNT_000_006	Makro_ReadPlatesInCartridge: No logical hotel found for cartridge {}	Configuration error	• Check the configuration of the logical carousel • Restart Freedom EVOware
EVO_CNT_000_007	Cannot find position for specified barcode: <barcode>	Plate with specified barcode not known to the carousel.	• Check barcode • Refer to the description of the commands PresentPlateByBC and ReturnPlateByBC
EVO_CNT_000_008	Could not read the Slot 'ID' of: {}	Configuration error	Check the configuration
EVO_CNT_000_009	Error: Exception thrown while communicating with robot driver. Unable to update labware: {}	Internal error	Contact your local service organization
EVO_CNT_000_010	Cartridge position <cartridge number>: Barcode unreadable	Damaged barcode	Check barcode label on cartridge
EVO_CNT_000_011	ERROR: Timeout occurred while synchronizing with tool thread	Timeout	Check log files for more information
EVO_CNT_000_012	Error: Doorlock is open.	Doors not closed	• Check correct operation of doorlock • Make sure safety doors are closed
EVO_CNT_000_013	Unable to update barcode for labware <{}> Barcode-ID: {}, cartridge: {}, slot: {} Reason: {}	Internal error	Contact your local service organization
EVO_CNT_000_014	Error: Firmware version is too old! Required version: {}	Incorrect firmware version.	Contact your local service organization
EVO_CNT_000_015	Hotel Error: Door or door lock is open!	Doors not closed	• Check correct operation of doorlock • Make sure safety doors are closed
EVO_CNT_000_016	Cannot read variables from database.	Internal error or incorrect device configuration.	Check configuration.
EVO_CNT_000_017	Cannot read instances from database.	Internal error or incorrect device configuration.	Check configuration.
EVO_CNT_000_018	Cartridge position <cartridge number>: No cartridge detected	Cartridge is missing	Check cartridge

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_CNT_001_000	ERROR: No Plate detected on the transfer station!	Plate was expected but not found on the transfer station	• Check configuration • Check for mechanical malfunction
EVO_CNT_001_001	ERROR: Plate detected on the transfer station!	Plate not expected but was found on the transfer station	• Check configuration • Check for mechanical malfunction
EVO_CNT_002_001	Temperature: {}°C / {}°F	Message with information on the temperature inside the carousel	n.a.
EVO_CNT_002_002	Humidity: {}%rH	Message with information on the humidity inside the carousel	n.a.
EVO_CNT_003_000	ERROR: Barcodes doesn't match for: {} scanned BC: ' {} ' expected BC: ' {}'	The carousel has re-scanned the barcode for confirmation but the new ID does not match the old one	Check the barcode
EVO_CNT_003_001	ERROR: Instance {} locked, unable to update ID slot.	Failed to read barcode because the plate is currently being accessed by another device; internal error	Contact your local service organization
EVO_CNT_003_002	ERROR: Unable to update Instance <{}>, DCOM error: {}	Internal error	Contact your local service organization
EVO_CNT_003_003	ERROR: Unable to update Instance <{}>, unknown exception catched	Internal error	Contact your local service organization
EVO_CNT_004_000	Hotel Error: {} Unknown Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_001	Hotel Error: {} General Handling Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_007	Hotel Error: {} Gate Open Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_008	Hotel Error: {} Gate Close Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_009	Hotel Error: {} General Lift Positioning Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_010	Hotel Error: {} User Access Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_011	Hotel Error: {} Stacker Slot Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_012	Hotel Error: {} Undefined stacker level has been requested	Carousel NT firmware command error	Contact your local service organization

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_CNT_004_013	Hotel Error: {} Plate Transfer Detection Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_014	Hotel Error: {} Lift Initialization Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_015	Hotel Error: {} Plate on Shovel Detection	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_016	Hotel Error: {} No Plate on Shovel Detection	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_017	Hotel Error: {} No recovery	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_019	Hotel Error: {} Shovel timeout	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_100	Hotel Error: {} Import Plate Stacker Positioning Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_101	Hotel Error: {} Import Plate Handler Transfer Turn out Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_102	Hotel Error: {} Import Plate shovel Transfer Outer Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_103	Hotel Error: {} Import Plate Lift Transfer Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_104	Hotel Error: {} Import Plate Shovel Transfer Inner Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_105	Hotel Error: {} Import Plate Handler Transfer Turn in Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_106	Hotel Error: {} Import Plate Lift Stacker Travel Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_107	Hotel Error: {} Import Plate Shovel Stacker Front Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_108	Hotel Error: {} Import Plate Lift Stacker Place Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_109	Hotel Error: {} Import Plate shovel Stacker Inner Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_110	Hotel Error: {} Import Plate Lift Travel Back Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_111	Hotel Error: {} Import Plate Lift Init Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_200	Hotel Error: {} Export Plate Lift Stacker Travel Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_201	Hotel Error: {} Export Plate Shovel Stacker Front Error	Carousel NT firmware command error	Contact your local service organization

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_CNT_004_202	Hotel Error: {} Export Plate Lift Stacker Import Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_203	Hotel Error: {} Export Plate Shovel Stacker Inner Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_204	Hotel Error: {} Export Plate Lift Transfer Positioning Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_205	Hotel Error: {} Export Plate Handler Transfer Turn out Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_206	Hotel Error: {} Export Plate Shovel Transfer Outer Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_207	Hotel Error: {} Export Plate Lift Transfer Place Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_208	Hotel Error: {} Export Plate Shovel Transfer Inner Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_209	Hotel Error: {} Export Plate Handler Transfer Turn in Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_210	Hotel Error: {} Export Plate Lift Travel Back Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_004_211	Hotel Error: {} Export Plate Lift Initializing Error	Carousel NT firmware command error	Contact your local service organization
EVO_CNT_005_000	Cartridge position {}: SAP-ID: {} S/N: {} Type: {} --- OK	Internal command has reported that the correct cartridge is present	n.a.
EVO_CNT_005_001	Cartridge position {}: SAP-ID: {} S/N: {} Type: {} --- Wrong cartridge detected	Internal command has reported that the wrong cartridge is present	Check if correct cartridge is present
Columbus Washer			
EVO_COL_000_000	Max. time for Auto Rinse is 24h	n.a.	n.a.
EVO_COL_000_001	Module successfully executed its COM registration.	n.a.	n.a.
EVO_COL_000_002	Module is unable to prepare its COM registration.	• Call name is missing • No right to write to registry	• Check driver INI file • Check user rights
EVO_COL_000_003	An unhandled exception has occurred.	Exception occurred during registration	• Check INI file • Check user rights
EVO_COL_000_004	No communication to device available. Device will be simulated.	Could not open COM port	Check configuration
EVO_COL_000_005	Error <error number> while initializing Communication!	Could not initialize COM port	Check configuration

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_COL_000_006	Init Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_007	Invalid Command	Washer firmware command error	Contact your local service organization
EVO_COL_000_008	Invalid Operand	Washer firmware command error	Contact your local service organization
EVO_COL_000_009	Invalid Command Sequence	Washer firmware command error	Contact your local service organization
EVO_COL_000_010	System Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_011	Time-out Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_012	Plate Mismatch	Washer firmware command error	Contact your local service organization
EVO_COL_000_013	Plate Transport Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_014	Manifold Transport Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_015	Dispense Pump Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_016	Fill Verification Dispense Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_017	Manifold Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_018	Waste Full Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_019	No Test defined	Washer firmware command error	Contact your local service organization
EVO_COL_000_020	Command Overflow	Washer firmware command error	Contact your local service organization
EVO_COL_000_021	Fill Verification Function Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_022	Fill Verification Aspiration Error	Washer firmware command error	Contact your local service organization
EVO_COL_000_023	Unknown error reported by device	Washer firmware command error	Contact your local service organization
EVO_COL_000_025	Timeout	Washer firmware command error	Contact your local service organization
Feeedom EVO			

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_000_000	Evoware is already running	Multisession is not permissible for EVOware	Start EVOware only once
EVO_EVO_000_001	Error reading settings file <file name>. Evoware uses defaults!	One of the configuration files is not accessible for reading	• Reinstall EVOware • Restore backup
EVO_EVO_000_002	Error writing settings file <file name>.	One of the configuration files is not accessible for writing	• Reinstall EVOware • Restore backup
EVO_EVO_000_003	Wrong version of settings file <file name>. Evoware uses defaults!	Inconsistent configuration	• Reinstall EVOware • Restore backup
EVO_EVO_000_004	Error creating log-file	Harddisk full	• Check harddisk • Reinstall EVOware
EVO_EVO_000_005	The instrument does not respond. Retry?	Instrument switched off Instrument not connected properly	Switch instrument on Check connections
EVO_EVO_000_006	Error writing <file name>	One of the configuration files is not accessible for writing	• Reinstall EVOware • Restore backup
EVO_EVO_000_007	Error reading liquid classes file <file name>	One of the configuration files is not accessible for reading	• Reinstall EVOware • Restore backup
EVO_EVO_000_008	Error writing liquid classes file <file name>	One of the configuration files is not accessible for writing	• Reinstall EVOware • Restore backup
EVO_EVO_000_009	Are you sure?	n.a.	n.a.
EVO_EVO_000_010	Error reading <file name>	One of the configuration files is not accessible	• Reinstall EVOware • Restore backup
EVO_EVO_000_011	No connection to the instrument. Retry?	Pipetting instrument not connected properly	Check connections.
EVO_EVO_000_012	Error loading device drivers: <file name>	Installation corrupt	• Reinstall EVOware
EVO_EVO_000_013	PMP - Connection Error: <error text> PMP will not continue.	• PMP driver loaded, but there is no PMP option installed • PMP option defective	• Disable driver in configuration • Field Service Engineer: Replace defective parts
EVO_EVO_000_014	PMP - Initialize Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_015	PMP - Stop Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_016	PMP - Drop Tips Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_000_017	PMP - Drop Tips Error: <error text> PMP continues.	PMP-related error	Contact your local service organization
EVO_EVO_000_018	PMP - Pickup Tips Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_019	PMP - Pickup Tips Error: <error text> PMP continues.	PMP-related error	Contact your local service organization
EVO_EVO_000_020	PMP - Set DITIs Back Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_021	PMP - Set DITIs Back Error: <error text> PMP continues.	PMP-related error	Contact your local service organization
EVO_EVO_000_022	PMP - Aspirate Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_023	PMP - Dispense Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_024	PMP - Mix Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_025	PMP - LClass Mix Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_026	PMP - Detect Liquid Error: <error text> PMP will not continue.	PMP-related error	Contact your local service organization
EVO_EVO_000_027	PMP Result for tip <number> : <result text>	n.a.	n.a.
EVO_EVO_000_028	Cannot create temporary file to initialize OPT file	One of the configuration files is not accessible for writing	• Reinstall EVOware • Restore backup
EVO_EVO_000_029	PMP driver shutdown error: <error text>	PMP-related error	Contact your local service organization
EVO_EVO_000_030	Checksum of <name> is missing or incorrect. Do you want to use it? Evoware will terminate if you answer with no.	File has been edited individually (not by means of EVOware)	• Do not edit file • Restore backup • Accept change (if you are aware of the consequences of the change)
EVO_EVO_000_031	Checksum of <name> is missing or incorrect. Do you want to use it?	File has been edited individually (not by means of EVOware)	• Do not edit file • Restore backup • Accept change (if you are aware of the consequences of the change)
EVO_EVO_001_000	Error reading configurations file	One of the configuration files is not accessible for reading	• Reinstall EVOware • Restore backup

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_001_001	Error in configuration file in line <number>	One of the configuration files is not accessible for reading	• Reinstall EVOware • Restore backup
EVO_EVO_001_002	Error writing configuration file	One of the configuration files is not accessible for writing	• Reinstall EVOware • Restore backup
EVO_EVO_001_003	Incompatible CFG File	A configuration file is currupt	• Reinstall EVOware
EVO_EVO_001_004	Old version of configuration file! Please define all elements new.	A configuration file stems from an older version of EVOware	• Reinstall EVOware • Use current version of file
EVO_EVO_001_005	LIHA not defined	A configuration file is currupt	• Configure LiHa in Configuration • Reinstall EVOware
EVO_EVO_002_000	Diluter <number> broken! Switching Diluter off!	Diluter error/defective	Check/replace diluter
EVO_EVO_002_001	DITI not dropped for tip<number>. Retry?	Problem with DiTi DiTi drop mechanism defective	User new DiTi Check DiTi drop mechanism
EVO_EVO_002_002	Internal error. Different pressure sensitivities used in one liquid detection action	Software error	Contact your local service organization
EVO_EVO_002_003	Internal error. Different liquid characteristics used in one liquid detection action	Software error	Contact your local service organization
EVO_EVO_002_004	No MPO found LICOS not installed	No MPO installed MPO defective	Check/replace MPO Install LICOS
EVO_EVO_002_005	No way to LiHa target found!\\Evoware switches into offline mode.	Inconsistent process definition	Check process definition
EVO_EVO_002_006	Internal Error: Illegal Move	Software error	Contact your local service organization
EVO_EVO_003_001	Error unloading device drivers: <file name>	Inconsistent installation	Reinstall EVOware
EVO_EVO_003_002	Error shutting down devices: <name>	Inconsistent installation	Reinstall EVOware
EVO_EVO_004_000	Maximum tip-misalignment exceeded ! Script execution will be aborted.	Tips misaligned/bent	Align/replace tips
EVO_EVO_005_000	Error starting processes: <name>	Process not executable	Modify process
EVO_EVO_005_001	Your process completed successfully !	n.a.	n.a.

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_005_002	Your process completed with errors !	n.a.	n.a.
EVO_EVO_005_003	Your process completed with warnings !	n.a.	n.a.
EVO_EVO_005_004	Error reading barcode file. File: <file name>	Barcode file corrupted	Check barcode file
EVO_EVO_005_005	Too many barcodes in line <number>.	Wrong file format	Check barcode file
EVO_EVO_005_006	Barcode '<number>' not found in database.	Inconsistent barcode information	Check barcode file
EVO_EVO_005_007	The following barcodes could not be found in the database	Inconsistent barcode information	Check barcode file
EVO_EVO_005_008	The process does not contain labware '<name>'.	Inconsistent process defintion	Check process definition
EVO_EVO_005_009	The selected script is empty! It cannot be executed!	Inconsistent script defintion	Check script definition
EVO_EVO_005_010	This command is not allowed in EVOware plus!	Command not permissible	Modify process definition
EVO_EVO_005_011	This run was not done as calibration run. Using the timing data for future runs will most likely result in timeouts. Do you still want to save?	n.a.	n.a.
EVO_EVO_005_012	Preparation of database failed!	Inconsistent database contents	Modify labware and carriers
EVO_EVO_005_013	Preparation of database failed! Details:	Inconsistent database contents	Modify labware and carriers
EVO_EVO_005_014	Number of iterations is too high for the available schedule files. Please create a fitting schedule file first or reduce the number of iterations. Valid range is 1 to <number>.	n.a.	n.a.
EVO_EVO_005_011	This run was not done as calibration run. Using the timing data for future runs will most likely result in timeouts. Do you still want to save?	n.a.	n.a.

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_006_000	Error initializing devices: <name>	• Device initialization failed • Instrument or device switched off • Incorrect address settings • Bad connections to device	• Check if device is powered • Check address settings • Check connections
EVO_EVO_007_000	Error while connecting to scheduler server: <name>	Scheduler not present, not registered or files missing	• Register Scheduler.exe/ Schedulerps.dll • Reinstall EVOware
EVO_EVO_007_001	Error opening <file name>	One of the configuration files is not accessible for reading	• Reinstall EVOware • Restore backup
EVO_EVO_007_002	Command not allowed in worklist	n.a.	Modify worklist
EVO_EVO_007_003	The variable '<name>' in process '<name>' already exists with a different scope.	n.a.	Rename variable
EVO_EVO_007_004	The variable '<name>' in process '<name>' already exists with a different type.	n.a.	Rename variable
EVO_EVO_007_005	The variable '<name>' in process '<name>' already exists with a different value. The value will not be changed.	n.a.	n.a.
EVO_EVO_007_006	File import for process variables failed! Possible causes: File does not exist or file access was denied.	n.a.	• Make sure file is available • Check access rights to file and folder
EVO_EVO_007_007	Operator query for process variables failed! The operator cancelled the query dialog.	n.a.	n.a.
EVO_EVO_008_000	Your script completed successfully!	n.a.	n.a.
EVO_EVO_008_001	Your script completed with errors!	n.a.	n.a.
EVO_EVO_008_002	Please define the script lines to execute.	n.a.	n.a.
EVO_EVO_008_003	Selected last line is larger than the line number of the actual script!	n.a.	n.a.
EVO_EVO_008_004	Running script	n.a.	n.a.
EVO_EVO_008_005	Run script!	n.a.	n.a.
EVO_EVO_008_006	Script contains errors! For more information see the log file.	Various	Check script definition

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_008_007	Script has been stopped!	n.a.	n.a.
EVO_EVO_009_000	This command is not allowed in EVOware plus!	Command not permissible	Modify process definition
EVO_EVO_009_001	Invalid command for asynchronous sub-routine	n.a.	Modify process definition
EVO_EVO_009_002	Could not start asynchronous sub-routine	Subroutine already running	Wait for completion of subroutine
EVO_EVO_009_003	Unknown operation mode for sub-routine	Undefined subroutine operation mode used	Use one of the defined operation modes in the subroutine command
EVO_EVO_009_004	Invalid command for sub-routine.	Command not permissible	Modify process definition
EVO_EVO_010_000	Pipetting was aborted	n.a.	n.a.
EVO_EVO_011_000	The value for Grid has to be between <number> and <number>.	Inconsistent grid position number	Correct grid position number
EVO_EVO_011_001	The value for Site has to be between <number> and <number>.	Inconsistent site position number	Correct grid position number
EVO_EVO_011_002	The value for Position in labware has to be between <number> and <number>.	Inconsistent position number on labware	Correct position number on labware
EVO_EVO_012_000	Initialization error	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_001	Invalid command	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_002	Invalid operand	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_003	Invalid command sequence	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_004	Device not implemented	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_005	Time-Out	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_006	Device not initialised	RoMa firmware command error	Contact your local service organization
EVO_EVO_012_007	Command Overflow	RoMa firmware command error	Contact your local service organization
EVO_EVO_013_000	No access to EEPROM	Te-CU firmware command error	Contact your local service organization
EVO_EVO_013_001	Error in power control circuit	Te-CU firmware command error	Contact your local service organization

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_002	Error in door lock #1	Door lock cannot lock/ unlock	Check door lock/latch
EVO_EVO_013_003	Error in door lock #2	Door lock cannot lock/ unlock	Check door lock/latch
EVO_EVO_013_004	Arm is collided	Crash has occurred	Check worktable layout Check process definition
EVO_EVO_013_005	No FLASH / EEPROM access	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_006	Error in power control circuit	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_007	Measurement failed	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_008	No liquid exit detected	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_009	Error in liquid sensor	LiHa firmware command error	Contact your local service organization
EVO_EVO_013_010	Application switch and axes mis-match	Incorrect replacement of instrument/parts	Field Service Engineer: Set application switch on PCB correctly
EVO_EVO_013_011	Wrong DC_Servo Type	Incorrect replacement of parts	Field Service Engineer: Use correct DC servo type
EVO_EVO_013_012	Labware not gripped	Labware not present Bad gripper alignment. Gripper defective.	Check worktable/process definition Align/repair gripper
EVO_EVO_013_013	Arm is collided	Crash has occurred See 18.1.18, 18-18.	Check worktable layout Check process definition
EVO_EVO_013_014	Error in power control circuit	RoMa firmware com-mand error	Contact your local service organization
EVO_EVO_013_015	ROMA collision with LIHA avoided	n.a.	n.a.
EVO_EVO_013_016	Error in EEPROM	PosID firmware command error	Contact your local service organization
EVO_EVO_013_017	No access to EEPROM	PosID firmware command error	Contact your local service organization
EVO_EVO_013_018	Invalid data in EEPROM	PosID firmware command error	Contact your local service organization
EVO_EVO_013_019	Special error in EEPROM	PosID firmware command error	Contact your local service organization
EVO_EVO_013_020	Invalid command	PosID firmware command error	Contact your local service organization

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_021	Invalid operand	PosID firmware command error	Contact your local service organization
EVO_EVO_013_022	Invalid number of operands	PosID firmware command error	Contact your local service organization
EVO_EVO_013_023	Invalid device address	PosID firmware command error	Contact your local service organization
EVO_EVO_013_024	Door already open	n.a.	n.a.
EVO_EVO_013_025	Hall sensors not calibrated	n.a.	Field Service Engineer: Calibrate hall sensors
EVO_EVO_013_026	Pump not defined	MPO/SPO firmware command error	Contact your local service organization
EVO_EVO_013_027	LICOS not calibrated	n.a.	Field Service Engineer: Calibrate LICOS
EVO_EVO_013_028	No access to EEPROM	MPO/SPO firmware command error	Contact your local service organization
EVO_EVO_013_029	Pressure sensor not calibrated	n.a.	Field Service Engineer: Calibrate pressure sensor
EVO_EVO_013_030	Command overflow of sub device	MPO/SPO firmware command error	Contact your local service organization
EVO_EVO_013_031	Pump stalled	MPO/SPO firmware command error	Contact your local service organization
EVO_EVO_013_037	Initialization error	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_038	Invalid command	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_039	Invalid operand	Diluter firmware command error See 18.1.7, 18-7	Contact your local service organization
EVO_EVO_013_040	Invalid command sequence	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_041	Dilutor not connected.	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_042	Error in EEPROM	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_043	Device not initialized	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_044	Plunger overload	Defective valve Clogged liquid system See 18.1.7, 18-7	Check diluter Check liquid system
EVO_EVO_013_045	Valve blocked	Defective valve	Replace valve

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_046	Movement not possible	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_047	No access to EEPROM	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_048	Command Overflow	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_049	Piezo communication error	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_050	Piezo module busy	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_051	Piezo parameter out of range	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_052	ADV param out of range	Diluter firmware command error	Contact your local service organization
EVO_EVO_013_053	No Low Volume installed	Low Volume firmware command error	Contact your local service organization
EVO_EVO_013_054	Pinch valve not installed	Low Volume firmware command error	Contact your local service organization
EVO_EVO_013_055	Endless mode not possible	Low Volume firmware command error	Contact your local service organization
EVO_EVO_013_056	Wrong node address	Low Volume firmware command error	Contact your local service organization
EVO_EVO_013_057	Picture not usable	n.a.	n.a.
EVO_EVO_013_058	Invalid operand	n.a.	n.a.
EVO_EVO_013_059	Picture is still processed	n.a.	n.a.
EVO_EVO_013_060	Error writing file	n.a.	n.a.
EVO_EVO_013_061	Error accessing file	n.a.	n.a.
EVO_EVO_013_062	Error reading file	n.a.	n.a.
EVO_EVO_013_063	Number is already used	n.a.	n.a.
EVO_EVO_013_064	Harddisk full	Storage capacity of harddisk exceeded	Perform data management on harddisk
EVO_EVO_013_065	Picture memory full	n.a.	n.a.
EVO_EVO_013_066	Error grabbing picture	n.a.	n.a.
EVO_EVO_013_067	X drive overload	Axis blocked	Check mechanics
EVO_EVO_013_068	Y drive overload	Axis blocked	Check mechanics
EVO_EVO_013_069	Z drive overload	Axis blocked	Check mechanics

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_070	No access to flash eeprom	Te-MagS firmware command error	Contact your local service organization
EVO_EVO_013_071	Command overflow	Te-MagS firmware command error	Contact your local service organization
EVO_EVO_013_072	Temperature overrun	Te-MagS firmware command error	Contact your local service organization
EVO_EVO_013_073	Temperature sensor short or open circuit	Te-MagS firmware command error	Contact your local service organization
EVO_EVO_013_074	Drive overload	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_075	Drive already running	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_076	No access to EEPROM	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_077	Command overflow	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_078	LICOS not calibrated	n.a.	Field Service Engineer: Calibrate LICOS
EVO_EVO_013_079	No access to EEPROM	Supervisor firmware command error	Contact your local service organization
EVO_EVO_013_080	Command overflow	Supervisor firmware command error	Contact your local service organization
EVO_EVO_013_081	Option not installed	MIO firmware command error	Contact your local service organization
EVO_EVO_013_082	Shaker position initialization error	MIO firmware command error	Contact your local service organization
EVO_EVO_013_083	Close door solenoid short or open circuit	MIO firmware command error	Contact your local service organization
EVO_EVO_013_084	EEPROM checksum error	MIO firmware command error	Contact your local service organization
EVO_EVO_013_085	EEPROM access error	MIO firmware command error	Contact your local service organization
EVO_EVO_013_086	Command overflow	MIO firmware command error	Contact your local service organization
EVO_EVO_013_087	Slot temperature overrun	MIO firmware command error	Contact your local service organization
EVO_EVO_013_088	Temperature sensor short or open circuit	MIO firmware command error	Contact your local service organization
EVO_EVO_013_089	Shaker Fail (motor not turning)	MIO firmware command error	Contact your local service organization

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_090	Temperature overrun	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_091	Temperature sensor short or open circuit	Te-Shake firmware command error	Contact your local service organization
EVO_EVO_013_093	Initialization Error	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_094	Invalid Command	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_095	Invalid Operand	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_096	Invalid Command Sequence	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_097	Device not implemented	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_098	Timeout error	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_099	Device not initialized	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_100	No liquid detected.	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_101	Collision detected	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_102	No access to parameter pages	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_103	Command overflow	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_104	Power fail	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_105	No Communication to Sub-Device.	Te-MO firmware command error	Contact your local service organization
EVO_EVO_013_106	Tips not fetched.	DiTis not picked up properly	Check DiTi pick up mechanism
EVO_EVO_013_107	Invalid Command	WRC firmware command error	Contact your local service organization
EVO_EVO_013_108	Invalid Operand	WRC firmware command error	Contact your local service organization
EVO_EVO_013_109	Device not implemented	WRC firmware command error	Contact your local service organization
EVO_EVO_013_110	Timeout Error	WRC firmware command error	Contact your local service organization

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_111	Reagent sensor not calibrated	n.a.	Field Service Engineer: Calibrate reagent sensor
EVO_EVO_013_112	EEPROM access error	WRC firmware command error	Contact your local service organization
EVO_EVO_013_113	Command overflow	WRC firmware command error	Contact your local service organization
EVO_EVO_013_114	Wash bottle 1 empty	n.a.	n.a.
EVO_EVO_013_115	Waste bottle full	n.a.	n.a.
EVO_EVO_013_116	Pump 1 low level	n.a.	n.a.
EVO_EVO_013_117	Pump 2 low level	n.a.	n.a.
EVO_EVO_013_118	Pump 3 low level	n.a.	n.a.
EVO_EVO_013_119	Pump 4 low level	n.a.	n.a.
EVO_EVO_013_120	Wash station empty	n.a.	n.a.
EVO_EVO_013_121	Wash station overflow	Clogged waste tubing	Check waste tubing
EVO_EVO_013_122	Sub-device not implemented	WRC firmware command error	Contact your local service organization
EVO_EVO_013_123	Wash bottle 2 empty	n.a.	n.a.
EVO_EVO_013_124	Sensor out of range	WRC firmware command error	Contact your local service organization
EVO_EVO_013_125	Initialization Error	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_126	Invalid Command	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_127	Invalid Operand	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_128	Invalid Command Sequence	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_129	Device not implemented	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_130	Timeout Error	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_131	Device not initialized	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_132	Command overflow by CU	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_133	No liquid level measured	LAC Option firmware command error	Contact your local service organization

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_134	Device collided with an obstacle	Obstruction on worktable	Check worktable layout Check process definition
EVO_EVO_013_135	Wrong checksum in flash parameter block	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_136	No access to flash parameter block	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_137	Collision avoided	n.a.	n.a.
EVO_EVO_013_138	No carrier detected	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_139	Command overflow in device	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_140	Power fail	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_141	Tube not detected	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_142	Invalid axis combination	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_143	Ultrasonic Transducer error	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_144	Temperature sensor error	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_145	Requested memory block size was not allocable	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_146	CreateTask() called too late	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_147	CkStackOV() didn't find NIL at end of RTX.DefTcbs	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_148	CkStackOV() found min task stack	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_149	CkStackOV() found task stack over-flow	LAC Option firmware command error	Contact your local service organization
EVO_EVO_013_150	No error	n.a.	n.a.
EVO_EVO_013_151	Invalid command	n.a.	n.a.
EVO_EVO_013_152	Unexpected error	n.a.	n.a.
EVO_EVO_013_153	Invalid number of operands	n.a.	n.a.
EVO_EVO_013_154	Invalid operand	n.a.	n.a.
EVO_EVO_013_155	RSP error reported in answer string	n.a.	n.a.
EVO_EVO_013_156	RSP not initialized	n.a.	n.a.

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_157	ROMA-vector not defined	n.a.	n.a.
EVO_EVO_013_158	ROMA-vector for this site is not defined	n.a.	n.a.
EVO_EVO_013_159	RSP still active	n.a.	n.a.
EVO_EVO_013_160	RSP not active	n.a.	n.a.
EVO_EVO_013_161	RSP not active	n.a.	n.a.
EVO_EVO_013_162	Cancel was pressed	n.a.	n.a.
EVO_EVO_013_163	Script could not be loaded / saved	n.a.	n.a.
EVO_EVO_013_164	Variable not defined	n.a.	n.a.
EVO_EVO_013_165	Advanced version of Evoware required	n.a.	n.a.
EVO_EVO_013_166	No labware gripped by ROMA	Labware not present Bad gripper alignment. Gripper defective.	Check worktable/process definition Align/repair gripper
EVO_EVO_013_167	Device not found	n.a.	n.a.
EVO_EVO_013_168	Timeout	n.a.	n.a.
EVO_EVO_013_169	Worklist already loaded	n.a.	n.a.
EVO_EVO_013_170	Initialization failed	PnP firmware command error	Contact your local service organization
EVO_EVO_013_171	Invalid command	PnP firmware command error	Contact your local service organization
EVO_EVO_013_172	Invalid operand	PnP firmware command error	Contact your local service organization
EVO_EVO_013_173	CAN acknowledge problems	PnP firmware command error	Contact your local service organization
EVO_EVO_013_174	Device not implemented	PnP firmware command error	Contact your local service organization
EVO_EVO_013_175	CAN answer timeout	PnP firmware command error	Contact your local service organization
EVO_EVO_013_176	Device not initialized	PnP firmware command error	Contact your local service organization
EVO_EVO_013_177	Command overflow of Freedom EVO control unit	PnP firmware command error	Contact your local service organization
EVO_EVO_013_178	Plate not fetched	PnP firmware command error	Contact your local service organization
EVO_EVO_013_179	Collision detected	PnP firmware command error	Contact your local service organization

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_180	No access to Flash-EEPROM	PnP firmware command error	Contact your local service organization
EVO_EVO_013_181	Command overflow of this device	PnP firmware command error	Contact your local service organization
EVO_EVO_013_182	Tube left in gripper	Tube sticks to gripper	Clean gripper
EVO_EVO_013_183	Tube not fetched	Tube not present Bad gripper alignment. Gripper defective.	Check worktable/process definition Align/repair gripper
EVO_EVO_013_184	Invalid axes combination	PnP firmware command error	Contact your local service organization
EVO_EVO_013_185	Initialization error	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_186	Invalid command	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_187	Invalid operand	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_188	Invalid command sequence	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_189	Device not implemented	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_190	Timeout error	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_191	Device not initialized	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_192	Command overflow of Freedom EVO control unit	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_193	Te-Stack collided with an obstacle	Obstruction on worktable See 18.1.21, 🗎 18-20	Check worktable layout Check process definition
EVO_EVO_013_194	No access to Flash-EPROM	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_195	Command overflow of the Te-Stack	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_196	Slide not in position!	Te-Stack firmware command error	Contact your local service organization
EVO_EVO_013_197	Stack not in position! Please install stack!	n.a.	Install stack
EVO_EVO_013_198	Carrier position empty!	There is no plate on stacker carrier for picking up	Put plate on stacker carrier

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_199	Carrier position not empty! Please remove labware!	n.a.	Remove labware
EVO_EVO_013_200	Stack empty! Please insert labware!	n.a.	Insert labware
EVO_EVO_013_201	Gripper not in zero position	Te-Stack command error	Contact your local service organization
EVO_EVO_013_202	Move does not cross BCR or CarSens window.	Te-Stack command error	Contact your local service organization
EVO_EVO_013_203	Cmd not possible now (ADP/ASP sequence error)	Te-Stack command error	Contact your local service organization
EVO_EVO_013_204	Barcode-Reader general error	Stacker barcode scanner defective	Check barcode scanner
EVO_EVO_013_205	Digital output(s) overloaded	Te-MO servo control firmware error (error 21)	• Reset servo control and retry • Contact your local service organization
EVO_EVO_013_206	Home position not found	Te-MO servo control firmware error (error 23)	• Reset servo control and retry • Contact your local service organization
EVO_EVO_013_207	Current limit exceeded	Te-MO servo control firmware error (error 41)	• Reset servo control and retry • Contact your local service organization
EVO_EVO_013_208	Current limit exceeded	Te-MO servo control firmware error (error 44)	• Reset servo control and retry • Contact your local service organization
EVO_EVO_013_209	Initialization error	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_210	Invalid command	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_211	Invalid operand	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_212	Invalid command sequence	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_213	Device not implemented	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_214	Timeout error	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_215	Device not initialized	Te-Servo firmware command error	Contact your local service organization

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_013_216	Command overflow of Freedom EVO control unit	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_217	Plunger collided	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_218	No access to Flash-EPROM	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_219	Missing configuration	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_220	Command overflow of the Te-Servo	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_221	Out of physical range	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_222	Multiple run curve error	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_223	Command not possible	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_224	End position not reached	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_225	Drive overheated	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_226	No move detected	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_227	Move was interupted	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_013_228	Internal calculation error	Te-Servo firmware command error	Contact your local service organization
EVO_EVO_014_000	Instrument has been switched off or disconnected! Evoware switches to offline mode and aborts script!	Instrument not connected properly	Switch instrument on Check connections
EVO_EVO_014_001	The process is not executable. Action aborted.	Process not executable, e.g. labware nodes not connected	Modify process
EVO_EVO_014_002	The script contains errors and is not executable. Action aborted.	Script validation failed	Load script into editor and correct errors
EVO_EVO_014_003	Auto-validation of scripts has been switched on!	n.a.	n.a.
EVO_EVO_014_004	Auto-validation of scripts has been switched off!	n.a.	n.a.
EVO_EVO_014_005	On-demand validation of current script has been started.	n.a.	n.a.

***Tab. 18-1** List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_014_006	There are schedules stored for this process. If the process is changed these schedules will be lost. To keep the original version with it's schedules please use 'Save As' to store the changed process under a new name. Save process under same name and loose schedules?	n.a.	n.a.
EVO_EVO_015_000	Error opening Named Pipe	Named Pipe could not be opend in “Command” command	• Check pipe name provided in command • Wait until pipe is available
EVO_EVO_016_002	Enter Barcode (PosID-2)	Refer to 18.1.16, 18-16	
EVO_EVO_016_003	Barcode Error (PosID-2)	Refer to 18.1.12, 18-13	
EVO_EVO_016_004	Clot Error	Refer to 18.1.2, 18-2	
EVO_EVO_016_005	Dilutor Overflow	Refer to 18.1.6, 18-6	
EVO_EVO_016_006	Dilutor Error	Refer to 18.1.7, 18-7	
EVO_EVO_016_007	DITI Already Mounted	Refer to 18.1.11, 18-12	
EVO_EVO_016_008	Error Fetching DITIs	Refer to 18.1.8, 18-9	
EVO_EVO_016_009	Te-MO DITI Error	Refer to 18.1.22, 18-22	
EVO_EVO_016_010	Lost DITI	Refer to 18.1.10, 18-11	
EVO_EVO_016_011	Doorlock Error	Refer to 18.1.19, 18-19	
EVO_EVO_016_023	Liquid Arrival Check Error	Refer to 18.1.5, 18-5	
EVO_EVO_016_024	Liquid Detection Error	Refer to 18.1.1, 18-1	
EVO_EVO_016_036	Grip Error	Refer to 18.1.20, 18-20	
EVO_EVO_016_040	Instrument Error dialog box	Refer to 18.1.18, 18-18	
EVO_EVO_016_042	Te-Stack Error	Refer to 18.1.21.1, 18-21	
EVO_EVO_016_043	Vacuum Waste Container	Refer to 18.1.26, 18-27	
EVO_EVO_016_048	WinWash Liquid Error	Refer to 18.1.25, 18-26	
EVO_EVO_016_049	WRC/Te-MO Error	Refer to 18.1.23, 18-23	
EVO_EVO_016_052	Clot Error (PMP)	Refer to 18.1.3, 18-3	
EVO_EVO_016_053	PMP Instrument Error	Refer to 18.1.4, 18-4	
EVO_EVO_017_000	A Te-MO has been detected but is not on the worktable. Evoware now prohibits LiHa access to the rear of the instrument.	n.a.	n.a.

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_017_001	"To the front" initialization is only available on Freedom instruments. Evoware will perform standard initialization.	n.a.	n.a.
EVO_EVO_017_002	Roma <number> not found!	RoMa command in script, but there is no RoMa	Modify script
EVO_EVO_017_003	PnP <number> not found!	PnP command in script, but there is no PnP	Modify script
EVO_EVO_018_000	Barcode could not be detected!	Stacker barcode scanner could not read barcode	Check barcode label on labware
EVO_EVO_019_000	TeMO x-coordinate too low!	n.a.	n.a.
EVO_EVO_020_000	Carrier <name> not found on grid <number>	• Barcode not readable • Carrier not present	• Check barcode • Check worktable
EVO_EVO_020_001	Carrier ID <number> not found in configuration	There is no carrier definition for this item	Check worktable
EVO_EVO_020_002	<axis>-coordinate of ROMA vector <value> point <value> is outside of allowed range	(Home) vector coordinate out of range	Teach RoMa (home) vector properly
EVO_EVO_021_000	PnP vector <name> not defined	Vector not found in Carrier.cfg	Teach vector with given name
EVO_EVO_022_000	Instrument has no LiHA <number>	LiHa command in script, but there is no LiHa	Modify script
EVO_EVO_023_000	Instrument error <error number> (<error text>), device <name>, command <name>	n.a.	n.a.
EVO_EVO_024_000	The resulting script contains invalid groups or loops. The action is canceled.	n.a.	Check script definition
EVO_EVO_025_000	Balance: Reset could not be performed. Device was busy! Retry?	n.a.	n.a.
EVO_EVO_025_001	Balance: Zeroing currently not executable; Device is busy! Retry?	n.a.	n.a.
EVO_EVO_025_002	Balance: Balance data inquiry could not be performed. Device was busy! Retry?	n.a.	n.a.
EVO_EVO_025_003	Balance is not responding! Retry?	Balance switched off Bad connection	Switch balance on Check connections
EVO_EVO_026_000	<axis>-coordinate of PnP vector "<value>" outside of allowed range	(Home) vector coordinate out of range	Teach PnP (home) vector properly

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_EVO_027_000	Waterbath <name> not connected!	n.a.	Check waterbath connections
EVO_EVO_028_000	No column offset (relative move in x) possible on right TeMO slide.	Te-MO relative move of tips on left side of Te-MO head, pipetting on the right slide	Mount tips on the right side of the Te-MO head to pipette on the right slide
EVO_EVO_028_001	No column offset (relative move in x) possible on left TeMO slide.	Te-MO relative move of tips on right side of Te-MO head, pipetting on the left slide	Mount tips on the left side of the Te-MO head to pipette on the left slide
EVO_EVO_029_000	Error opening barcode output file.	• Barcode file of obsolete PosID • File not accessible	• Check output path in configuration • Check access rights to file and folder
EVO_EVO_030_000	Unable to write header to file: Header must be written by first export command acessing the file.	Previous “Export Variable” command did not write header	First “Export Variable” command must write header, correct script
EVO_EVO_030_001	Unable to write variables to file: Conflicts in header strings - variable order or variable count do not match.	Variable not found in header of export file	Choose correct file or change variable selection
EVO_EVO_031_000	Illegal line number <number> specified for Import Variable command: Legal range is 1 to <number>!	Line number exceeded range, using “Read specified line” option	Check script definition
Global messages			
EVO_GLO_000_000	The response for message {} timed out.	Internal communication error. E.g. a hardware option failed or did not respond while a pipetting script was running.	
IVD Incubator			
EVO_IVD_000_000	Error getting configuration from database:	No carrier definition in database	Create carrier definition
EVO_IVD_000_001	Error getting number of sites from database:	n.a.	n.a.
EVO_IVD_000_002	Device carrier configuration read from database: Position layout [<number>/<number>/<number>] = <number> available sites.	n.a.	n.a.
EVO_IVD_000_003	Configuration error	Error in carrier definition	Check carrier definition
EVO_IVD_000_004	Number of carrier sites does not match number of modules in configuration.	Carrier definition does not correspond with driver INI file	Modify carrier definition or driver configuration

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_IVD_000_005	CloseDrawer for slot <number> failed: Return value = <number>.	Drawer malfunction	Check drawer
EVO_IVD_000_006	Slot number is out of range!	Selected slot does not exist	Check script definition
EVO_IVD_000_007	Current temperature of slot <number> is <value> °C.	n.a.	n.a.
EVO_IVD_000_008	Current temperature of slot <number> could not be determined. Device reported Error <error number>.	Washer firmware command error	Contact your local service organization
EVO_IVD_000_009	Successfully initialized.	n.a.	n.a.
EVO_IVD_000_010	Initialization failed.	Error during initiatlization	Restart EVOware Restart EVOware and instrument Check configuration Contact your local service organization
LiHa			
EVO_LIH_000_000	Module successfully executed its COM registration.	n.a.	n.a.
EVO_LIH_000_001	Module is unable to prepare its COM registration.	• Call name is missing • No right to write to registry	• Check driver INI file • Check user rights
EVO_LIH_000_002	An unhandled exception has occurred.	Exception occurred during registration	• Check INI file • Check user rights
EVO_LIH_000_003	No communication to device available. Device will be simulated.	COM port could not be opened	Check device configuration
EVO_LIH_000_004	Error <error number> while initializing Communication!	Windows responded with an error while opening COM	Check configuration
EVO_LIH_003_000	Could not connect to Message Server.	Could not connect to MCS	Check registration of MCS
EVO_LIH_003_001	Message thread could not be stopped.	(in debug mode only)	n.a.
EVO_LIH_004_000	General error during database registration!	Problem during connection to database	• Restart EVOware • Restore backup • Reinstall EVOware
EVO_LIH_004_001	Scheduler could not be reached!	Could not connect the scheduler	• Restart EVOware • Reinstall EVOware

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_LIH_005_000	Cannot read variables from database.	Error when reading variables from the database	• Restart EVOware • Restore backup • Reinstall EVOware
EVO_LIH_005_001	Cannot read instances from database.	Error when reading instances from the database	• Restart EVOware • Restore backup • Reinstall EVOware
PosID-3			
EVO_PID_001_001	Error while initializing PosID device: Collision avoidance request has timed out.	Internal error	Restart Freedom EVOware. If this does not help, contact your local service organization.
EVO_PID_001_002	Error while getting initialization status from PosID device. PosID3 error: {} - {} Severity: {}	Internal error	Contact your local service organization
EVO_PID_001_003	Error reading carrier barcode on grid {0}	Refer to 18.1.13, 18-13	
EVO_PID_001_005	Error while getting initialization status from PosID device: {}	Internal error	Contact your local service organization
EVO_PID_001_006	Error reading labware {} (grid {}) barcode	Refer to 18.1.14, 18-14	
EVO_PID_001_007	Unexpected carrier barcode on grid {} . Expected{} . Scanned{}	Refer to 18.1.13, 18-13	
EVO_PID_001_008	Carrier or tube rack re-scan required	Carrier or tube rack re-scan required for double-blind check	Make sure the carrier / tube rack is inserted correctly and click OK
EVO_PID_001_009	Error while initializing PosID device: {}	Internal error	Contact your local service organization
EVO_PID_001_010	Aborted by user.	User aborted the operation (e.g. by clicking Cancel in a barcode error prompt).	n.a.
EVO_PID_001_011	Error getting carrier definition for carrier type '{0}'.	Internal error or carrier code unknown to Freedom EVOware	• Check barcode on carrier • Check the carrier code (barcode prefix) in the carrier editor
EVO_PID_001_013	Error while setting the barcode definitions. PosID3 error: {} - {}	Internal error	Contact your local service organization
EVO_PID_001_014	Error while setting the barcode definitions: {}	Internal error	Contact your local service organization
EVO_PID_001_015	An error occured while storing scanned barcodes.	Internal error	Contact your local service organization

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_PID_001_016	Error writing barcode file	File not accessible	• Check output path in configuration • Check access rights to file and folder
EVO_PID_001_017	IOState will be set to off because connection to instrument could not be established	• Device initialization failed • Instrument or device switched off • Incorrect communication settings • Bad connections to device	• Restart Freedom EVOware • Check if device is powered • Check communication settings • Check connections
EVO_PID_001_018	Cannot connect to PosID-3 communication driver	Internal error	Contact your local service organization
EVO_PID_001_019	Cannot connect to PosID-3 communication driver	Internal error	Contact your local service organization
EVO_PID_001_020	Cannot connect to collision avoidance system	Internal error	Restart Freedom EVOware. If this does not help, contact your local service organization
EVO_PID_001_021	Error retrieving communication channel name.	Internal error	Restart Freedom EVOware. If this does not help, contact your local service organization
EVO_PID_001_022	Collision avoidance request has timed out.	Internal error	Restart Freedom EVOware. If this does not help, contact your local service organization
EVO_PID_001_023	Collision avoidance error.	Internal error	Restart Freedom EVOware. If this does not help, contact your local service organization
EVO_PID_001_024	Error while scanning carrier {}: {}	Internal error	Contact your local service organization
EVO_PID_001_025	Error while scanning carrier {}: {}	Internal error	Contact your local service organization

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_PID_001_026	Error while scanning carrier {}. PosID3 error: {} - {}	Each carrier or tube rack is fitted with two barcodes. This is done to enhance scanning accuracy. The two barcodes only differ in the separator character between the carrier code and the barcode ("\" or "/"). This error occurs if the barcode characters which follow the separator do not match.	Check the barcode.
EVO_PID_001_027	Error closing doorlocks!	The doors could not be closed and the user clicked Cancel	n.a.
EVO_PID_001_028	Driver is not initialized!	The PosID-3 driver must be initialized before running the script	Freedom EVOware Plus: Go to the process editor and click Initialize before you open the script editor and run the script
EVO_PID_001_029	Aborted by system	User aborted the operation	n.a.
EVO_PID_001_030	Tube Barcode Error (PosID-3)	Refer to 18.1.14, 18-14	
EVO_PID_001_031	Enter Barcode (PosID-3)	Refer to 18.1.16, 18-16	
EVO_PID_001_032	Enter Barcode (PosID-3, Double Blind Entry)	Refer to 18.1.17, 18-17	
EVO_PID_001_033	No carrier detected on grid <grid position>	The carrier barcode has been scanned (carrier is present) but the PosID-3 cannot grip it	• Make sure the carrier / tube rack is inserted correctly • Check for mechanical malfunction
EVO_PID_001_034	n.a.	A scanning error was reported and the user clicked ignore in the Carrier Barcode Error dialog box.	n.a.
EVO_PID_003_001	Barcodes are not identical	Double Blind Entry is enabled and the two barcodes you entered are not the same.	Enter the same barcode in both fields.
Symbol BC Scanner			
EVO_SBC_000_000	Generated ID <name>	n.a.	n.a.
EVO_SBC_000_001	Barcode <name>	n.a.	n.a.

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_SBC_000_002	Generated ID <name> could not be saved in DB	Labware not found in the database or labware locked	• Restart EVOware • Restore backup • Reinstall EVOware
EVO_SBC_000_003	Error accessing labware '<name>' in the database.	Labware not found in the database	• Restart EVOware • Restore backup • Reinstall EVOware
EVO_SBC_000_004	Execution was successful	n.a.	n.a.
EVO_SBC_000_005	Error occured during execution	n.a. (protocol message)	n.a.
Scheduler			
EVO_SCH_000_000	Halt pressed, system Interrupted!	n.a.	n.a.
EVO_SCH_000_001	Module <name> registered.	n.a.	n.a.
EVO_SCH_000_002	Instrument <name> is ready.	n.a.	n.a.
EVO_SCH_000_003	Loading module	n.a.	n.a.
EVO_SCH_000_004	GetInstrument: Index out of range.	GetInstrument requested with wrong index	Contact your local service organization
EVO_SCH_000_005	GetInstrument: Bad index.	GetInstrument requested with wrong index	Contact your local service organization
EVO_SCH_000_006	LoadInstruments is currently not allowed.	Inernal error	Contact your local service organization
EVO_SCH_000_007	LoadAllInstruments is currently not allowed.	Inernal error	Contact your local service organization
EVO_SCH_000_008	UnloadInstruments is already running.	Inernal error	Contact your local service organization
EVO_SCH_000_009	UnloadInstruments can not be run at this time.	Inernal error	Contact your local service organization
EVO_SCH_000_010	Initialization currently not allowed.	Inernal error	Contact your local service organization
EVO_SCH_000_011	Configuration file has been changed. Initialization aborted.	Trac.ini has been modified	Restore originial file or open configuration and accept changes
EVO_SCH_000_012	Error initializing instrument drivers. Instrument driver '<name>' unreachable!: <error text>	Communication to driver failed	• Restart EVOware • Reboot computer • Reinstall EVOware
EVO_SCH_000_013	Could not start scheduler	Scheduler could not be connected or shut down	Restart EVOware
EVO_SCH_000_014	Error shutting down instruments. Instrument driver '<name>' unreachable!: <error text>	Communication to driver failed	If error recurs contact your local service organization

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_SCH_000_015	Instrument driver '<name>' unreachable!: <error text>	Communication to driver failed	If error recurs contact your local service organization
EVO_SCH_000_016	Instrument driver '<name>' unreachable!: unknown error	Communication to driver failed	If error recurs contact your local service organization
EVO_SCH_000_017	Resource Missing!	Process contains resource but driver is not installed	Add/activate driver or change process
EVO_SCH_000_018	Unknown	n.a.	n.a.
EVO_SCH_000_019	Cannot initialize Module	n.a.	Check hardware connections and driver configuration
EVO_SCH_000_020	Cannot shut down Module	n.a.	Check hardware connections and driver configuration
EVO_SCH_001_000	Scheduler Error: cannot allocate memory!	Insufficient memory	• Increase page file size • Increase RAM resources
EVO_SCH_002_000	Revision <revision number> of process '<name>' was requested but the current revision is <revision number>.	A schedule will be started but a contained process was changed	Update saved schedule or restore original process file
EVO_SCH_002_001	Create not called.	Inernal error	Contact your local service organization
EVO_SCH_002_002	No software license found or evaluation period expired. Program will unload.	n.a.	Check your licence agreement
EVO_SCH_002_003	There is no valid schedule available for saving.	n.a.	n.a.
EVO_SCH_002_004	Failure while loading schedule information from disk	Schedule file not accessible	Check access rights to schedule file/process folder
EVO_SCH_002_005	The schedule file is not valid.	File is corrupt	Check schedule file
EVO_SCH_002_006	Scheduler is running.	n.a.	n.a.
EVO_SCH_002_007	Process is not executable.	Process saved is invalid	Check process definition
EVO_SCH_002_008	Error: Configuration file is invalid / has been changed. Protocols cannot be executed.	Trac.ini has been modified	Restore originial file or open configuration and accept changes
EVO_SCH_002_009	Cannot open File for Simulation Output!	File not accessible	Check access rights to file and folder

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_SCH_002_010	Could not connect to MCS server.	Connection to MCS server failed	Call up “MCS -regserver” in command prompt
EVO_SCH_002_011	System successfully recovered! Please check Labware and finish all canceled steps manually!	n.a.	n.a.
EVO_SCH_002_012	System Recovery	n.a.	n.a.
EVO_SCH_002_013	System pause requested by user. Waiting for pending requests to finish...	n.a.	n.a.
EVO_SCH_002_014	Recover Method	n.a.	n.a.
EVO_SCH_002_015	System successfully recovered!	n.a.	n.a.
EVO_SCH_002_016	Can not open Recoveryfile	File not accessible	Check access rights to file and folder
EVO_SCH_002_017	Impossible to schedule due to insufficient resource capacity. Add resources or increase allowed waiting times to allow sequential use of resource.	n.a.	n.a.
EVO_SCH_002_018	System pause requested by module '<name>'. Waiting for pending requests to finish...	n.a.	n.a.
EVO_SCH_002_019	The macro '<name>'is still active.	n.a.	n.a.
EVO_SCH_002_020	Module timeout caused by <name>. Timeout buffer started...	n.a.	n.a.
EVO_SCH_002_021	System resumes...	n.a.	n.a.
EVO_SCH_002_022	Error opening schedule file '<file name>'.	Save schedule failed	Check access rights to file and folder
EVO_SCH_002_023	Error writing schedule file '<file name>'-	• Save schedule failed • Storage capacity of harddisk exceeded	• Perform data management on harddisk • Contact your local service organization
EVO_SCH_003_000	SetReservation <macro name> (<macro ID>) Start <start time> (<duration>)	Internal error	Contact your local service organization
EVO_SCH_003_001	CheckRessources failed <macro name> (<macro ID>) Start <start time> (<duration>)	Internal error	Contact your local service organization
EVO_SCH_003_002	SetReservation	n.a. (window title)	n.a.

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_SCH_003_003	Macro <name> <macro ID> could not be restored! (Start=<start time> Duration=<duration> Module=<name>)!	Internal error	Contact your local service organization
EVO_SCH_003_004	Macro <name> <macro ID> could not be restored! (Start=<start time> Duration=<duration> Module=?)!	Internal error	Contact your local service organization
EVO_SCH_003_005	Action <name>(ID) is not reserved! (Start= <earliest start time> - <latest start time> Modul=<name>)	Internal error	Contact your local service organization
EVO_SCH_004_000	Process impossible to schedule!	Inconsistent process	Check process definition/ time settings
EVO_SCH_004_001	Robot access for Source and Destination location in Process is incompatible!	No robot is allowed for both carriers/locations	Reconfigure carriers or change process
EVO_SCH_004_002	Process Restored! Time <duration>	n.a.	n.a.
EVO_SCH_004_003	Error backup reservation <ID>! Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_004_004	Process <name> stopped!	n.a.	n.a.
EVO_SCH_004_005	Process <name> cancelled!	n.a.	n.a.
EVO_SCH_004_006	Check Ressources failed! Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_004_007	Process <name> can not be restored! Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_004_008	CheckRessources failed after restore Process! <name> Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_004_009	Macro <macro name> (<macro ID>) could not be restored Start=<start time> Duration=<duration> Modul=<name> !	Internal error	Contact your local service organization
EVO_SCH_004_010	Macro <macro name> (<macro ID>) could not be restored Start= <start time> Duration= <duration> Modul=?!	Internal error	Contact your local service organization
EVO_SCH_004_011	Start Recovery Process for Process <name> (ID)!	n.a.	n.a.
EVO_SCH_005_000	Allowed waiting time of macro <macro name> (<macro ID>) must be increased to <waiting time> for macro <macro name> (<macro ID>)!	Scheduling of process impossible due to timing problems	Increase permissible waiting time as suggested

Tab. 18-1 List of error messages (cont.)

Error ID	Message Text	Reason	Corrective Measure
EVO_SCH_005_001	CheckOccupation failed <macro name> (<macro ID>)	Internal error	Contact your local service organization
EVO_SCH_006_000	Ressource of Mainaction <name>(<ID>) for <name>(<ID>) not available! Time=<duration>	Internal error	Contact your local service organization
EVO_SCH_007_000	No instruments.	n.a.	n.a.
EVO_SCH_007_001	Loading device drivers timed out while waiting for feedback from driver '	Driver did not register with scheduler	• Restart device and system • Contact your local service organization
EVO_SCH_008_000	Can not allocate memory for Time file. Time fit will not work properly.	Insufficient memory	• Increase page file size • Increase RAM resources
Startup wizard			
EVO_TIN_001_000	No error	n.a.	n.a.
EVO_TIN_001_001	Administrator rights necessary	n.a.	n.a.
EVO_TIN_001_002	Read only property	n.a.	n.a.
EVO_TIN_001_003	Write only property	n.a.	n.a.
EVO_TIN_001_004	Language not supported	n.a.	n.a.
EVO_TIN_001_005	Wrong parameter	n.a.	n.a.
EVO_TIN_001_006	Not logged in	n.a.	n.a.
EVO_TIN_001_007	Login	n.a.	n.a.
EVO_TIN_001_008	Wrong password	n.a.	n.a.
EVO_TIN_001_009	Password not compliant	n.a.	n.a.
EVO_TIN_001_010	Passwords identical	n.a.	n.a.
EVO_TIN_001_011	Passwords already used	n.a.	n.a.
EVO_TIN_001_012	Could not access user database	n.a.	n.a.
EVO_TIN_001_013	User does not exist	User not defined	Call administrator to have user properly defined
EVO_TIN_001_014	User is disabled	n.a.	n.a.
EVO_TIN_001_015	Login failed	n.a.	n.a.
EVO_TIN_001_016	Initial password expired	n.a.	n.a.
EVO_TIN_001_017	Password expired	n.a.	n.a.
EVO_TIN_001_018	Wrong login	n.a.	n.a.
EVO_TIN_001_019	Administrator right needed	n.a.	n.a.

Tab. 18-1 *List of error messages (cont.)*

Error ID	Message Text	Reason	Corrective Measure
EVO_TIN_001_020	EVOware Application Specialist needed	n.a.	n.a.
EVO_TIN_001_021	This user has no rights in EVOware	User not properly defined	Call administrator to have user properly defined
EVO_TIN_001_022	First time initialization needed! Please login as administrator	n.a.	n.a.
EVO_TIN_001_023	Unspecified user management error	n.a.	n.a.

19 Customer Support

Purpose of This Chapter

This chapter informs you how to contact us in case help is needed. It lists addresses and telephone numbers of the manufacturer's representatives.

How to get Help

Tecan and its representatives maintain a fully trained staff of technical specialists around the world. For any technical question, contact the nearest Tecan representative.

Feedback on This Manual

If you have any comments on this Software Manual or suggestions for improvement, please send them by e-mail to **docfeedback@tecan.com**.
In your e-mail, please specify the manual name, the document ID and the manual version. This information is shown at the bottom of each printed page and on the first page of the help file (context-sensitive help of software products).

Addresses

Contact your local distributor or one of the addresses below.
Also see our homepage on the web: **www.tecan.com**

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A Appendix A

This chapter contains background information on file and directory structures, system tools for Freedom EVOware and advanced worklist commands.

A.1 Overview of the Log Files

Freedom EVOware writes log files to document the pipetting, to record user actions and changes to parameter values, to help you to check scripts in offline mode and to find errors. The log files are written to a specified directory (default <install_path>\AuditTrail\Log).

- A new log file of **type EVO** is created each time Freedom EVOware is started. It contains initialization information from the Freedom EVOware software, the Freedom EVOware version number and the serial number of the pipetting instrument. It also contains information on the hardware options and external devices which are currently connected to the pipetting instrument, including their firmware versions.
- A new log file of **type EVO** is also created each time a pipetting script or process is started. It contains information about the script, the position of the instrument arms and the instrument settings.
- Each time the pipetting instrument is initialized, Freedom EVOware writes information on the positions of arms, the connected external devices and the COM ports into a new log file of **type EVO**.
- Freedom EVOware always creates log files of type EVO. Using the Configuration Tool, users with Administrator or Application Specialist rights can activate additional log files of **type USR** and **type ERR** with different levels of logging detail. See A.1.2 “Structure of Log Files of Type USR”, A-9 and A.1.3 “Structure of Log Files of Type ERR”, A-9 for more information.
- Log files of **type MACRO** (file name MACRO*.log) contain messages from internal Freedom EVOware commands (macros). The information which is logged can also be viewed in the EVOware/Macro channel of the LogViewer tool. See also A.1.4 “Log Files of Type MACRO”, A-10.
- Log files of **type DB** (file name DB*.log) contain messages from Freedom EVOware’s internal database. See also A.1.5 “Log Files of Type DB”, A-10.
- Log files of **type MCS** (file name MCS*.log) contain messages from the Message Control Server. The MCS does not normally create log files. To activate logging for the MCS, see A.1.6 “Log Files of Type MCS”, A-10.
- In addition, the **Export Data** command can be included in pipetting scripts to create report files on pipetting operations (see 15.26 “Export Data Command”, 15-48).

You can also view recent log entries by choosing *Log Window* in the *View* menu. The Log Window has the same contents as the log file of type EVO and initially shows the last 1000 log entries.

Note: *Freedom EVOware can output a large amount of logging information. It is recommended to back up and then delete the old log files on a regular basis. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See A.9.6 “Audit Trail Archiving tool”, A-47.*

A.1.1 Structure of Log Files of Type EVO

A log file of type EVO has the highest level of logging detail. The file names are EVO_YYYYMMDD_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time. Each log file of type EVO is protected with a checksum which is stored in the first line of the file.

Freedom EVOware always creates log files of type EVO. The information which is logged can also be viewed in the Tecan/EVOware/Log channel of the LogViewer tool (see A.10 “LogViewer Tool”, A-72).

Each time Freedom EVOware is started, a new log file of type EVO is created in the specified log files directory (default <install_path>\AuditTrail\Log). It contains initialization information from the Freedom EVOware software, the Freedom EVOware version number and the serial number of the pipetting instrument. It also contains information on the hardware options and external devices which are currently connected to the pipetting instrument, including their firmware versions.

A new log file of type EVO is also created each time you run a script or process. It contains the record types A to E and G from Tab. A-1, A-8 and includes information on pipetting commands, user inputs and errors/warnings. If a device error is reported in a log file of type EVO, the log file of type MACRO may contain additional information on the error. This depends on the type of error.

Check the *Log serial data* checkbox in the Configuration Tool if you want to include the record type F (instrument firmware commands) too. See 8.3.1.4 “Protocol Options Tab”, 8-8. This will significantly increase the size of the log files.

The serial data can be useful when investigating communication errors. The log file also includes firmware commands for devices which are connected to the instrument’s CAN bus (e.g. LiHa, RoMa, PnP, incubator(s), Te-Shake, Te-MagS, Te-VacS and Te-Stack). It does not include firmware commands from devices which have their own RS232 interface.

See 8.4.3.2 “Logging Option”, 8-36 for information on log files for devices which have their own RS232 interface.

The following example shows part of a log file of type EVO*.log (the record types are described in Tab. A-1, A-8):

```
7BEFBDC6
20040721_103529 admin
               Freedom EVOware, Version 1.2.28.301
D 10:35:29     Starting program "Aspirate.esc" (lines 1 to 2)
F 10:35:29     > P1,SGO0
               - P1,0
               > P1,LAA0,0,4
               - P1,0
               > P1,PIG
               - P1,0

E 10:35:29  0 Line    1 : Aspirate
F 10:35:29     > W2,RPX0
               - W2,0,-100
               > C2,RPX0
               - C2,0,9680
               > C2,RPR0
               - C2,0,0
E 10:35:29  0
     tip 1 : aspirate 52.06µl  1, 1 Tube 13*75mm 16 Pos [9,1]
                      50.00µl "Water" Standard <15 - 500µl> Single
     tip 2 : aspirate 52.06µl  1, 2 Tube 13*75mm 16 Pos [9,1]
```

```
                          50.00µl "Water" Standard <15 - 500µl> Single
F 10:35:29    > C5,SHZ2080,2080,2080,2080,2080,2080,2080,2080
              - C5,0
              > C5,RPX0
              - C5,0,1295
              > C5,RPY0
              - C5,0,1031,90
              > W2,RPX0
              - W2,0,-100
              > C2,RPX0
              - C2,0,9680
              > C2,RPR0
              - C2,0,0
      > C5,PAA2000,-32,188,1225,1225,2080,2080,2080,2080,2080,2080
F 10:35:31    - C5,0
              > C5,RTS
              - C5,0,227
              > C5,SDM7,1
              - C5,0
              > C5,SSL600,600,,,,,,
              - C5,0
              > C5,SDL40,40,,,,,,
              - C5,0
              > C5,STL1225,1225,,,,,,
              - C5,0
              > C5,SML490,490,2100,2100,2100,2100,2100,2100
              - C5,0
              > C5,SBL20,20,,,,,,
              - C5,0
              > C5,MDT3,,,,19,19,0,0,0,0,0,0
F 10:35:37    * C5,11
              > C5,REE
              - C5,0,@@@@K@@@@@@
              > C5,RVZ1
              - C5,0,544,502,0,0,0,0,0,0
C 10:35:37  0 tip 1 : OK / automatic handling
              tip 2 : not enough liquid
F 10:35:37    > O1,ALO1,0
              - O1,0
              > O1,RSL1
              - O1,0,1
              > O1,ALO2,0
              - O1,0
              > O1,SSL1,0
              - O1,0
              > O1,SSL2,2
              - O1,0
D 10:36:42  0 button "pipette air" has been pressed
F 10:36:42    > O1,ALO1,1
F 10:36:43    - O1,0
              > O1,ALO2,1
              - O1,0
              > C5,RPZ0
              > O1,RSL2
              - O1,0,2
              > O1,SSL2,0
              - C5,0,513,2080,2080,2080,2080,2080,2080,2080
              - O1,0
```

```
                > C5,SSZ21,,,,,,,
                > O1,SSL1,1
                - C5,0
                > C5,SEP900,900,,,,,,
                - O1,0
                - C5,0
                > C5,STZ-7,0,,,,,,
                - C5,0
                > C5,MTR156,156,,,,,,
F 10:36:44      - C5,0
                > C5,RPZ0
                - C5,0,506,2080,2080,2080,2080,2080,2080,2080
                > C5,SSZ200,,,,,,,
                - C5,0
                > C5,MAZ583,,,,,,,
F 10:36:45      - C5,0
                > C5,PVL0,0,,,,,,
                - C5,0
                > C5,SEP420,420,,,,,,
                - C5,0
                > C5,PPR30,30,,,,,,
                - C5,0
                > C5,RTS
                - C5,0,227

E 10:36:45  0 detected_volume_1 = 207
              detected_volume_2 = 20
              detected_volume_3 = -1
              detected_volume_4 = -1
              detected_volume_5 = -1
              detected_volume_6 = -1
              detected_volume_7 = -1
              detected_volume_8 = -1
              Line    2 : Dispense
F 10:36:45    > W2,RPX0
              - W2,0,-100
              > C2,RPX0
              - C2,0,9680
              > C2,RPR0
              - C2,0,0
E 10:36:45  0
     tip 1 : dispense 62.06µl  1, 1 Wash Station Waste [6,2]
                      50.00µl "Water" Standard <15 - 500µl> Single
     tip 2 : dispense 62.06µl  1, 2 Wash Station Waste [6,2]
                      50.00µl "Water" Standard <15 - 500µl> Single
F 10:36:45    > C5,SHZ2080,2080,2080,2080,2080,2080,2080,2080
              - C5,0
              > C5,RPX0
              - C5,0,2000
              > C5,RPY0
              - C5,0,-32,188
              > W2,RPX0
              - W2,0,-100
              > C2,RPX0
              - C2,0,9680
              > C2,RPR0
              - C2,0,0
      > C5,PAA1295,1031,90,1200,1200,2080,2080,2080,2080,2080,2080
```

```
F 10:36:47    - C5,0
              > C5,RTS
F 10:36:48    - C5,0,227
              > C5,RPP0
              - C5,0,246,246,120,120,120,120,120,0
              > C5,RPZ0
              - C5,0,1200,1200,2080,2080,2080,2080,2080,2080
              > C5,SEP3600,3600,,,,,,
              - C5,0
              > C5,SPP900,900,,,,,,
              - C5,0
              > C5,STZ0,0,,,,,,
              - C5,0
              > C5,MTR-186,-186,,,,,,
              - C5,0
              > C5,RPZ0
              - C5,0,1200,1200,2080,2080,2080,2080,2080,2080
              > C5,RTS
              - C5,0,227

E 10:36:48  0 detected_volume_1 = -1
              detected_volume_2 = -1
              detected_volume_3 = -1
              detected_volume_4 = -1
              detected_volume_5 = -1
              detected_volume_6 = -1
              detected_volume_7 = -1
              detected_volume_8 = -1
F 10:36:48    > P1,SGO0
              - P1,0
              > P1,LAA0,0,4
              - P1,0
              > O1,ALO1,0
              - O1,0
              > O1,ALO2,0
              - O1,0
              > O1,RSL1
              - O1,0,1
              > O1,SSL1,0
              - O1,0
              > O1,RSL2
              - O1,0,0
              > O1,SPS0
              - O1,0
F 10:37:02    > O1,RSL1
              - O1,0,0
              > O1,RSL2
              - O1,0,0
C 10:37:24    Should Evoware move all arms to their home position?
D 10:37:31    button Yes has been pressed
A 10:37:31    SHUTTING DOWN DEVICES
A 10:37:32    UNLOADING DEVICE DRIVERS
              Named Pipe 3 closed
              Named Pipe 2 closed
              Named Pipe 1 closed
              SHUTTING DOWN INSTRUMENTS
F 10:37:32    > O1,ALO1,1
              - O1,0
```

```
                    > O1,ALO2,1
F 10:37:33          - O1,0
                    > C1,SRA
                    - C1,0
                    > C1,REE
                    - C1,0,@@@@@
                    > C1,RPR0
                    - C1,0,0
                    > C1,RPG0
                    - C1,0,900
                    > C1,PAG900
                    - C1,0
                    > C2,RPX0
                    - C2,0,9680
                    > C2,RPY0
                    - C2,0,1059
                    > C2,RPZ0
                    - C2,0,2548
                    > C2,RPR0
                    - C2,0,0
                    > C2,RPG0
                    - C2,0,900
                    > C2,RPR0
                    - C2,0,0
                    > C1,SAA1,9680,1059,2548,0,,1
                    - C1,0
                    > C1,RPR0
                    - C1,0,0
                    > C1,RPG0
                    - C1,0,900
                    > C6,RPX0
                    - C6,0,1295
                    > C1,AAA
                    - C1,0
                    > C2,RPX0
                    - C2,0,9680
                    > C2,RPY0
                    - C2,0,1059
                    > C2,RPZ0
                    - C2,0,2548
                    > C2,RPR0
                    - C2,0,0
                    > C2,RPG0
                    - C2,0,900
                    > W2,RPX0
                    - W2,0,-100
                    > C2,RPX0
                    - C2,0,9680
                    > C2,RPR0
                    - C2,0,0
                    > C5,RPX0
                    - C5,0,1295
                    > C5,RPY0
                    - C5,0,1031,90
                    > W2,RPX0
                    - W2,0,-100
                    > C2,RPX0
                    - C2,0,9680
```

```
                  > C2,RPR0
                  - C2,0,0
                  > C5,SHZ2080,2080,2080,2080,2080,2080,2080,2080
                  - C5,0
                > C5,PAA1295,1031,90,1200,1200,450,450,450,540,540,860
F 10:37:34        - C5,0
                  > W1,PAG280
                  - W1,0
                  > W2,RPX0
                  - W2,0,-100
                  > W2,RPY0
                  - W2,0,-700
                  > W2,RPZ0
                  - W2,0,2600
                  > W2,RPR0
                  - W2,0,0
                  > W2,RPG0
                  - W2,0,280
                  > C6,RPX0
                  - C6,0,1295
                  > W1,PAA-100,-700,2600,0
F 10:37:35        - W1,0
                  > W2,RPX0
                  - W2,0,-100
                  > W2,RPY0
                  - W2,0,-700
                  > W2,RPZ0
                  - W2,0,2600
                  > W2,RPR0
                  - W2,0,0
                  > W2,RPG0
                  - W2,0,280
                  > O6,STT0
                  - O6,0
                  > O6,RLC
                  - O6,0,1
                  > O1,ALO1,0
                  - O1,0
                  > O1,ALO2,0
                  - O1,0
                  > C5,SDZ390,390,-500,-500,-500,-270,-270,50
                  - C5,0
A 10:37:35        setting baudrate 38400
F 10:37:35        > M1,SHB5
                  - M1,0
A 10:37:38        quitting Genesis driver
                  quitting Evoware
                  closing log-file
```

Each line has the following structure:

Tab. A-1 *Structure of the log files*

Column	Explanation
1	Alpha character which indicates the type of logged information: A = internal event B = dialog was opened C = message appeared on the screen D = user action E = pipetting command F = serial data (instrument firmware command): command prefix ">" = command sent to the instrument command prefix "-" = response from the instrument command prefix "*" = response from the instrument reports an error G = named pipe command or response
2	Space character
3 .. 10	The time in the format *hh:mm:ss*
11 - 12	Space characters
13	Freedom EVOware Plus: Process copy ID (process instance ID) minus 1. Freedom EVOware Standard: always 0.
14	Space character
15 .. End of Line	Additional information depending on the type of record

Note: *Some of the columns 1 to 10 are filled with space characters if the type of information or the time has not changed since the previous line.*

Line 1 of each log file contains the file checksum. Line 2 contains the creation date and time of the log file and the name of the currently logged in user. Line 3 contains the Freedom EVOware software build code (this is not the same as the Freedom EVOware version).

The log file entries for a pipetting command, taken from the above log file example, are as follows:

```
D 10:35:29    Starting program "Aspirate.esc" (lines 1 to 2)
F 10:35:29    > P1,SGO0
              - P1,0
              > P1,LAA0,0,4
              - P1,0
              > P1,PIG
              - P1,0
E 10:35:29  0 Line    1 : Aspirate
F 10:35:29    > W2,RPX0
              - W2,0,-100
              > C2,RPX0
              - C2,0,9680
              > C2,RPR0
              - C2,0,0
E 10:35:29  0
     tip 1 : aspirate 52.06µl  1, 1 Tube 13*75mm 16 Pos [9,1]
                      50.00µl "Water" Standard <15 - 500µl> Single
     tip 2 : aspirate 52.06µl  1, 2 Tube 13*75mm 16 Pos [9,1]
```

```
                                50.00µl "Water" Standard <15 - 500µl> Single
"Starting program “Aspirate.esc" ...
```

Freedom EVOware started to process the pipetting script “Aspirate.esc” at 10:35:29. The following six lines show firmware commands which were sent to and received from the pipetting instrument.

"Line 1 : Aspirate" ...

Line 1 of the Freedom EVOware script was executed by process copy “0”. It contains an Aspirate command. The following six lines show firmware commands which were sent to and received from the pipetting instrument.

"tip 1 : aspirate 52.06µl 1, 1 Tube 13*75mm 16 Pos [9,1]"

Tip 1 executes an Aspirate command which aspirated 52.06 µl (the net volume of liquid after applying the calibration factor and offset from the liquid class) from well 1,1 (X and Y position) of the labware *Tube 13*75mm, 16 Pos.* (the configuration name of the labware). The labware was positioned at [9,1] (grid 9, carrier site 1).

"50.00µl "Water" Standard <15 - 500µl> Single"

The net volume (without calibration) was 50.00 µl. The liquid class *Water* and sub-class *Standard <15 - 500µl>* was used. The command is a single pipetting command.

"tip 2 : aspirate 52.06µl 1, 1 Tube 13*75mm 16 Pos [9,1]"

Tip 2 executes an Aspirate command which aspirated 52.06 µl (the net volume of liquid after applying the calibration factor and offset from the liquid class) from well 1,2 (X and Y position) of the labware *Tube 13*75mm, 16 Pos.* (the configuration name of the labware). The labware was positioned at [9,1] (grid 9, carrier site 1).

"50.00µl "Water" Standard <15 - 500µl> Single"

The net volume (without calibration) was 50.00 µl. The liquid class *Water* and sub-class *Standard <15 - 500µl>* was used. The command is a single pipetting command.

A.1.2 Structure of Log Files of Type USR

A log file of type USR contains information on pipetting commands and user inputs. The file names are USR_YYYYMMDD_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time. Each log file of type USR is protected with a checksum which is stored in the first line of the file.

If you activate this log file type (see 8.3.1.4 “Protocol Options Tab”, 🗎 8-8), a new log file of type USR is created in the specified log files directory (default <install_path>\AuditTrail\Log) each time you start Freedom EVOware or run a script.

It contains the record types D and E from Tab. A-1, 🗎 A-8.

The information which is logged can also be viewed in the Tecan/EVOware/Usr channel of the LogViewer tool (see A.10 “LogViewer Tool”, 🗎 A-72).

A.1.3 Structure of Log Files of Type ERR

A log file of type ERR contains information on pipetting commands, user inputs and errors/warnings. The file names are ERR_YYYYMMDD_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time. Each

log file of type ERR is protected with a checksum which is stored in the first line of the file.

If you activate this log file type (see 8.3.1.4 “Protocol Options Tab”, 🗎 8-8), a new log file of type ERR is created in the specified log files directory (default <install_path>\AuditTrail\Log) each time you start Freedom EVOware or run a script. The error file is empty (except for the checksum at the beginning) if no errors took place.

It contains the record types C, D and E from Tab. A-1, 🗎 A-8.

The information which is logged can also be viewed in the Tecan/EVOware/Error channel of the LogViewer tool (see A.10 “LogViewer Tool”, 🗎 A-72).

A.1.4 Log Files of Type MACRO

Log files of type MACRO contain messages from internal Freedom EVOware commands (macros). The file names are MACRO_YYYYMMDD_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time. If a device error is reported in a log file of type EVO, the log file of type MACRO may contain additional information on the error. This depends on the type of error.

The information which is logged can also be viewed in the Tecan/EVOware/Macro channel of the LogViewer tool (see A.10 “LogViewer Tool”, 🗎 A-72).

A.1.5 Log Files of Type DB

Log files of type DB contain messages from Freedom EVOware’s internal database. The log files are created in c:\program files\Tecan\AuditTrail\log. The file names are DB_YYYYMMDD_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time.

The information which is logged can also be viewed in the Tecan/Database channel of the LogViewer tool (see A.10 “LogViewer Tool”, 🗎 A-72).

A.1.6 Log Files of Type MCS

Log Files of type MCS contain messages from the Message Control Server (MCS) in Freedom EVOware. The log files are created in the same directory as the mcs.exe executable file (default c:\program files\common files\Tecan_MCS). The file names are MCS_YYYYMMDD_HHMMSS.log, where YYYYMMDD is the creation date and HHMMSS is the creation time.

The MCS does not normally output logging information. Proceed as follows to activate the logging function for the MCS:

- Edit mcs.ini in the same directory as the mcs.exe executable file and set the required logging level.
- The mcs.exe process must be re-started after editing the mcs.ini file. To do this, exit Freedom EVOware, stop the mcs.exe process in the Windows Task Manager and re-start Freedom EVOware. This re-starts mcs.exe.
- Alternatively, use the Zip & Send tool to set the logging level (see A.9.5 “Zip & Send Tool”, 🗎 A-42).

To avoid logging an excessive amount of data, this logging feature should be disabled when it is not needed.

The information which is logged can also be viewed in the Tecan/MCS channel of the LogViewer tool (see A.10 “LogViewer Tool”, 🗎 A-72).

A.1.7 Structure of the Trace File (Audit Trail)

The trace file contains information on configuration, data and log files which have been created, edited or saved. The default location for the trace file is <install_path>\AuditTrail\Log.

Each time a configuration, data or log file is created or modified, a CRC checksum is stored in the file and an entry is made in the trace file.

Each entry in the trace file specifies the date and time, the name of the currently logged in user and the file name. Log files are created by Freedom EVOware automatically and a user name is not included in the trace file entry in this case. The trace file can be viewed with a plain text editor.

Each time a configuration or data file is modified and saved, the previous version is archived in the <install_path>\AuditTrail\Configuration sub-directory. The date and time is appended to the original filename. The archive copy includes the user-specified reason for the change if “Electronic Signatures” is enabled in the Freedom EVOware Configuration Tool (see B.5.5 “Electronic Signatures”, B-9).

All changes relating to user management are recorded in the user management audit trail (see B.5.3.1 “User Management Audit Trail”, B-8).

A.2 Structure of the Barcode Files

The following sections describe the syntax of the barcode files which Freedom EVOware creates. It also describes the syntax of the barcode files which are required by the Carousel and Carousel NT commands LoadBCFromFile and by the *Specify plates by barcodes* option in the Freedom EVOware Plus Runtime Controller.

A.2.1 Barcode files written by the Carousel commands

The Carousel commands ReadAllBarcodes and ReadPlatesInCartridge and the Carousel NT commands ScanAllCartridges, ScanCartridge and ScanLocation read the barcodes of the labware in the carousel and create a text file which contains the barcodes .

Carousel

The name and path of the barcode file is specified in the carousel configuration (see 8.5.2.3 “Carousel Configuration - Barcode File Settings Tab”, 8-43).

The default file name is <carousel_driver_call_name>_PosList.txt, e.g. Carousel_PosList.txt.

The default location is <install_path>\Output.

Carousel NT

The name of the barcode file is <carousel_driver_call_name>_PosList.txt, e.g. CarouselNT_PosList.txt.

The default location is <install_path>\Output.

When the barcodes are scanned, the barcode file will be overwritten if it already exists.

The structure is as follows:

[Carousel]
1,1=20038451
1,2=20061299
1,3=20273850

1,4=
1,5=20078804
...
2,1=20273853
2,2=20265063
...
[Carousel_DITIs]
4,1=20265140
4,2=20078802
4,3=
4,4=20265141
...

The carousel can be subdivided into two or more logical carousels, and the barcode file has a separate section for each of them (see 9.5.5.3 “Carousel Carrier Attributes”, 🗎 9-50). The section headers show the names of the logical carousels (i.e. the names of the carousel carriers) in square brackets. The subsequent lines list the labware items. Each labware item is on a separate line with the following syntax:

<tower><slot>=<scanned_barcode>

<scanned_barcode> is missing if there is no labware at this position or the labware has no barcode. The order of the entries in the list depends on the order in which the carousel scans the labware.

Carousel slots are counted from the top downwards.

If the carousel barcode scanner cannot read the barcode of one of the labware items, a default (simulated) barcodes is used instead (see 8.5.2.2 “Carousel Configuration - Scanner Settings Tab”, 🗎 8-42 and/or 8.5.3.4 “Carousel NT Configuration - Barcode Settings Tab”, 🗎 8-47).

A.2.1.1 Barcode files read by the Carousel commands

The Carousel and Carousel NT command LoadBCFromFile reads a list of barcodes from a text file and assigns them to labware in the carousel. The required barcode file has the same format (syntax) as the barcode files written by the Carousel commands ReadAllBarcodes and ReadPlatesInCartridge and the Carousel NT commands ScanAllCartridges, ScanCartridge and ScanLocation (see A.2.1 “Barcode files written by the Carousel commands”, 🗎 A-11).

The following additional points should be noted:

- To allow the barcodes to be correctly assigned to the labware, the section headers in the input file (e.g. [Carousel_DITIs]) must be identical to the section headers in the barcode files which are written by the other carousel commands listed above. Tip: Write a test script which creates a barcode file to get the correct spelling of the section headers for the input file.
- If a tower/slot entry is missing in the input file, the existing barcode (if any) will not be changed.
- If a tower/slot entry is present in the input file but does not have a value, an empty barcode will be written.

Example input file for the carousel (for the carrier name “Hotel”):

[Hotel]
1,1=ABC
1,3=

When the LoadBCFromFile command reads the input file:

- Barcode „ABC“ will be assigned to the labware in Tower 1, Slot 1.
- An empty barcode will be assigned to the labware in Tower 1, Slot 3.
- The barcode already assigned to the labware in Tower 1, Slot 2 (if any) will not be changed.

A.2.2 Barcode file written by the PosID and PosID-3 commands

The PosID and PosID-3 commands can be configured to write a report file with the scanned barcodes. The filename is scan.csv and it is written to the configured Output directory (default path <install_path>\Output). Existing files with the same name are overwritten.

.

Each line in the file contains the following parameters, separated by semicolons:

Grid;site on carrier (always 1 for tube racks);tube position in tube rack (missing or 0 for other labware types);configuration name of labware or tube;labware or tube rack name (yellow label on the worktable);carrier or tube rack barcode;labware or tube barcode.

The file contains one line per scanned labware or tube barcode. The first line of the file contains a CRC checksum. Starting with line 2, the structure of the file is as follows:

```
GridPos,SiteOnGrid,TipNumber,ConfigName,RackLabel,CarrierBarcode,SRCRackID
```

The parameters are as follows:

GridPos
Worktable grid position of the labware.

SiteOnGrid
Carrier site (always 1 for tube racks).

TipNumber
Tube position in tube rack (missing or 0 for other labware types).

ConfigName
Configuration name of labware or tube rack.

RackLabel
Name (label) of labware or tube rack (yellow label on the worktable).

CarrierBarcode
Carrier or tube rack barcode.

SRCRackID
Labware or tube barcode.

The labware or tube barcode field contains three stars (***) if the barcode cannot be read. For tubes, it contains $$$ if the tube is missing.

The file does not include column headers.

A.2.3 Barcode File for the PosID-3 Driver

For the purpose of testing or training, the PosID-3 driver can be configured to read simulated barcodes from a text fiie and return them to Freedom EVOware through

the PosID-3 - Scan command as if the PosID-3 has actually scanned some labware.

Proceed as follows to use this feature:

- Create a text file with barcodes using the syntax described below.
- Set the I/O State of the PosID-3 driver to OFF.
- In the configuration of the PosID-3 driver, check the *Enable barcode file usage* checkbox and specify the path and name of the barcode file (see 8.5.19.2 “PosID-3 Configuration - Settings Tab”, 8-80). The suggested file name is PosID3_ManualBarcodes.txt.

The .txt file should have the following structure:

Create a section "[Grid<grid number>]" for each grid position to be scanned, where <grid number> is the number of the grid where the carrier is located.

Create a new line <position_number>=<barcode> for each tube or labware item at the specified grid position, where <position_number> is the tube number or site number.

Use "***" to simulate positions with scan errors and "$$$" to simulate positions with missing tubes.

Example file:

```
[Grid12]
1=10001
2=***
3=10003
4=10004
[Grid14]
1=20001
2=$$$
3=20003
4=20004
```

A.2.4 Barcode File for the Labware Generator

For the purpose of testing or training, the context menu of the labware generator lets you import a list of labware barcodes from a file and assign them to labware on the worktable or in a labware feeder such as the carousel (see 11.6.3 “Context Menu of the Labware Generator”, 11-19). Tube barcodes cannot be imported in this way.

File syntax

Line 1 of the file contains the column headers (field names) as follows:

GridPos
Column number in the labware generator.

SiteOnGrid
Row number in the labware generator.

SRCRackID
Labware barcode.

Line 2 of the file contains a dummy string consisting of at least one alphanumeric character. The dummy string is ignored but line 2 must not be empty or omitted.

The data lines start at line 3. The last data line must end with <CR><LF> (press Return in the text editor when you create the file).

The barcodes are assigned to the currently selected labware group in the labware generator. To select a group, click on one of the labware items in the group. The selected labware items are shown with a shaded yellow colour.

When you create the labware group in the labware generator, you must do this in a single step. If you create the labware group using several steps and choose non-adjacent wells, you will not be able to select the entire group to assign the barcodes.

Data lines in the barcode file for column number(s) which are not included in the currently selected labware group will be ignored. For example, if the first labware group extends over columns 1 and 2 in the labware generator and you select this labware group when you import the barcode list, data lines for column 3 (GridPos=3) will be ignored.

Example file:

GridPos,SiteOnGrid,SRCRackID
dummy_string
1,1,ABB123
1,2,BAB321
1,3,DCC123

A.2.5 Barcode File for the Freedom EVOware Plus Runtime Controller

The *Specify plates by barcodes* option in the Freedom EVOware Plus Runtime Controller allows you to run processes using specific labware items which are identified by their barcodes.

If you check the *Specify plates by barcodes* checkbox, you will prompted to choose a .txt or .csv file which contains a list of barcodes.

The .txt file should have the following structure:

MyLabware001,MyLabware002,Sample1,Reagent1
ABB123,BAB321,DCC123,AAA123,BBA321
DED123,BAB321,BCD123,BBB123,CDA321
...

The first line of the file is a comma-separated list of the labware source icon names (as shown in the Process Editor). You do not need to include all of the source icon names which are used in your process. You only need to include the source icon names whose barcodes are relevant.

Subsequent lines list the barcodes of the labware which should be used. Freedom EVOware Plus lets you run several processes in parallel, and each line lists the barcodes for one process copy. Make sure that there are enough lines for the number of process copies you want to run. Each line should include the same number of barcodes as the number of labware source icon names in the first line.

Empty lines in the file are ignored. You can use semicolons “;” or pipe characters “|” as the separator character instead of commas. The barcodes must not include any of these three separator characters.

The structure of the .csv file is as follows:

Put the labware source icon names in the first row of the table, each of them in a separate table cell. Subsequent rows of the table contain the barcodes of the labware which should be used.

Note: *This feature is only intended for random access storage devices such as the carousel (the stacker is a first-in last-out storage device, not random access). For labware in the carousel, you can use the ReadAllBarcodes or ReadPlatesInCartridge commands to read the barcodes and store them in a text file (see 16.3 "Commands for the Carousel", 16-2).*

A.3 Parameters in the Evoware.opt file

The following tables list user-configurable parameters in six different sections of the evoware.opt file. evoware.opt is in the <install_path>/Database directory. These settings should only be changed by specialists.

Note: *The parameters in evoware.opt are already configured with suitable values. The values should only be changed for special applications. Do not change the values of parameters which are not listed in the following tables.*

Add a new line to the respective section of the evoware.opt file if the parameter is missing.

Default values: Each parameter string is shown below with the default value of the parameter (some parameters do not have a default value). The parameter string is not case sensitive.

Note: *Freedom EVOware must be re-started for the changes to take effect.*

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing this file, you will be warned that the checksum is invalid. Proceed as follows to repair the checksum:

- Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned again that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see A.9.2 “Validate Configuration Tool”, A-36).

Tab. A-2 *Evoware.opt parameters, [OPTIONS] section*

Parameter string	Description	Range, units
Lauda_Pump_Speed=3	Speed of pump for Lauda water-bath.	1 to 5
Csv_With_Semicolon=0	1= Use “;” instead of “,” as the field separator in the CSV file created by the Export Data command. This parameter also controls the field separator for the Import Variable and Export Variable commands (see 15.42.2, 15-107). It has no influence on the scan.csv file exported by the PosID com-mand, which always uses “;” as the field separator.	0 or 1
Posid_Allocation_Timeout=60000	Time-out for collision avoidance.	0 to ∞, in ms
LiHa_Allocation_Timeout=60000	Time-out for collision avoidance.	0 to ∞, in ms
RoMa_Allocation_Timeout=60000	Time-out for collision avoidance.	0 to ∞, in ms
PnP_Allocation_Timeout=60000	Time-out for collision avoidance.	0 to ∞, in ms
Diluter_OFF=tipMask	Turns the diluter off for the speci-fied tip(s).	0 to 255, bit-mapped

Tab. A-2 *Evoware.opt parameters, [OPTIONS] section (cont.)*

Parameter string	Description	Range, units
Optimize_Ztravel=0	1=When moving above a carrier, retract to Z-travel for the highest labware on the carrier instead of to global Z-travel. This can reduce the time required for the move.	0 or 1
Outrigger_Distance=0	Length of the RoMa grippers (overrides value in the firmware).	in 0.1 mm
Reduce_CPU_Usage=0	1=Allocate less cpu priority to EVOware tasks. Allows other software to run faster.	0 or 1
Disable_CA=0	1=Disable collision avoidance globally. This setting is only needed for special applications and is only intended for specialists. Use with care!!	0 or 1
Poolsafe_Balances	Specify how many pooling balances are fitted to your system. Omit this parameter or specify 0 if none are fitted.	-
LIHA_CheckForDeadlocks MCA_CheckForDeadlocks MCA384_CheckForDeadlocks	If the pipetting instrument is fitted with two liquid handling, MCA96 or MCA384 arms, rare situations can lead to a deadlock situation, e.g. if both arms are pipetting simultaneously on opposite ends of the same labware and both of them move towards the middle of the labware. 0 = Do not check for arm deadlocks; use the normal collision avoidance routines. 1 = Check for arm deadlocks and resolve them if necessary.	0 or 1

Tab. A-3 *Evoware.opt parameters, [OBSTACLES] section*

Parameter string	Description	Range, units
No_Temo_Obstacle=0	Specify 1 if the Te-MO is not on the worktable (i.e. it is not an obstacle for LiHa, RoMa or PnP movements).	0 or 1
Obstacle1=xLeft,yRear,xRight,yFront	You can specify up to 10 worktable obstacles for LiHa, RoMa or PnP movements which are not otherwise known to EVOware. Specify the obstacle position with the coordinates of its left/rear and front/right edges.	in 0.1 mm

Tab. A-4 *Evoware.opt parameters, [DITI] section*

Parameter string	Description	Range, units
Lower_Eject_OFF=0	1=Disable Lower DITI Eject.	0 or 1
Lower_Eject_200=700	Specifies Lower DITI Eject height for DITI 200 tips; this parameter is normally configured with the Setup & Service software.	0 to 2100 steps
Lower_Eject_1000=1075	Specifies Lower DITI Eject height for DITI 1000 tips; this parameter is normally configured with the Setup & Service software.	0 to 2100 steps
Subroutine=pathname	Specify the path and name of subroutine (script file) to be executed after getting the last DITI from the rack. Use it e.g. to fetch new DITI racks. This parameter is only intended for Freedom EVOware Standard. The following internal variables can be used in the script: __diti_grid, __diti_site and __diti_index (see 9.4.5 “Labware Types and DITI Types”, 9-32, DITI Index).	-
Allow_Reuse_PMP=0	The PMP option does not normally allow you re-use DITIs after an aspirate-dispense sequence. Specify 1 if you want to allow the DITIs to be reused. PMP will only be used for the first aspirate-dispense sequence and subsequent aspirate-dispense sequences will use normal pipetting.	

Tab. A-5 *Evoware.opt parameters, [NANO] section*

Parameter string	Description	Range, units
Accel_X=500 Accel_Y=500 Accel_Z=500	Specify the acceleration of LiHa movements for nano-pipetting. Reduced acceleration can improve pipetting accuracy due to reduced vibration.	in 0.1 mm/s^2

Tab. A-6 *Evoware.opt parameters, [PRINT] section*

Parameter string	Description	Range, units
Left=50 Right=50 Top=50 Bottom=50	Specify the required print border for printed reports.	printer dots

Tab. A-7 *Evoware.opt parameters, [TEMO] section*

Parameter string	Description	Range, units
Skip_Tipblock_Commands=0	1=Ignore Get/Drop Tipblock commands. Enable this feature if you don't want to exchange the tipblock during the script. In this case, the tipblock must be fitted before the script is run.	0 or 1
Second_Diti_Drop=1	1=Enable second DITI drop movement to solve problems with DITI dropping due to electrostatic charges (see 15.56.7.1, 15-133); if necessary, you can also specify the DITI_SIDE_STEPS parameters (see below).	0 or 1
Delay_Diti_Drop=200	Delay between first and second DITI drop movement.	in ms
Relative_Move_Diti_Drop=100	Z-distance between first and second DITI drop movement.	in 0.1 mm
Retract_Speed_Diti_Drop=200	Retract speed between first and second DITI drop movement.	in 0.1 mm
OptimizeZtravel=1	Minimizes Z movements when carrying out the Te-MO 96 Wash command.	0 or 1
Y2_Maxspeed=2000	Maximum movement speed of slide 2 (center slide).	(min to max speed as defined in the firmware)

Tab. A-7 *Evoware.opt parameters, [TEMO] section (cont.)*

Parameter string	Description	Range, units
Plunger_Drop_Diti=68000	Plunger movement (Z-direction) for DITI eject (Te-MO 96). *It is not recommended to change this parameter.*	plunger steps
Plunger_Drop_Speed=50	Plunger drop speed for DITI eject (Te-MO 96).	plunger steps/s
Diti_Side_Steps_X=0	Used to solve problems with DITI dropping due to electrostatic charges (see 15.56.7.1, 15-133). Recommended value if you want to use this feature: -180	in 0.1 mm
Diti_Side_Steps_Y=0	Used to solve problems with DITI dropping due to electrostatic charges (see 15.56.7.1, 15-133). Recommended value if you want to use this feature: 0	in 0.1 mm
Diti_Side_Steps_Z=0	Used to solve problems with DITI dropping due to electrostatic charges (see 15.56.7.1, 15-133). Recommended value if you want to use this feature: 90	in 0.1 mm
Low_Init=0	1=The Te-MO pipetting head is lowered to local z-travel above the wash block before initializing the plunger and moved up again afterwards. This avoids the risk of spilling liquid during initialization. 0=The Te-MO pipetting head moves above the wash block during initialization but it is not lowered.	0 or 1

Tab. A-8 *Evoware.opt parameters, [MCA] section*

Parameter string	Description	Range, units
Skip_Tipblock_Commands=0	1=Ignore Get/Drop Tipblock commands. Enable this feature if you don't want to exchange the tipblock during the script. In this case, the tipblock must be fitted before the script is run.	0 or 1
Second_Diti_Drop=1	1=Enable second DITI drop movement to solve problems with DITI dropping due to electrostatic charges (see 15.56.7.1, 15-133); if necessary, you can also specify the DITI_SIDE_STEPS parameters (see below).	0 or 1
Delay_Diti_Drop=200	Delay between first and second DITI drop movement.	in ms
Relative_Move_Diti_Drop=100	Z-distance between first and second DITI drop movement.	in 0.1 mm
Retract_Speed_Diti_Drop=200	Retract speed between first and second DITI drop movement.	in 0.1 mm
OptimizeZtravel=1	Minimizes Z movements when carrying out the MCA96 Wash command.	0 or 1
Diti_Pwm_Limit	Vertical force to use when mounting 96 tips. [a)]	force units
Diti_Pwm_Limit1	Vertical force to use when mounting 1 tip. [a)]	force units

Tab. A-8 *Evoware.opt parameters, [MCA] section (cont.)*

Parameter string	Description	Range, units
Tipblock_Pwm	Vertical force to use when mounting a tipblock.	force units
Diti_Side_Steps_X=0	Used to solve problems with DITI dropping due to electrostatic charges (see 15.56.7.1, 15-133). Recommended value if you want to use this feature: -180	in 0.1 mm
Diti_Side_Steps_Y=0	Used to solve problems with DITI dropping due to electrostatic charges (see 15.56.7.1, 15-133). Recommended value if you want to use this feature: 0	in 0.1 mm
Diti_Side_Steps_Z=0	Used to solve problems with DITI dropping due to electrostatic charges (see 15.56.7.1, 15-133). Recommended value if you want to use this feature: 90	in 0.1 mm

a) The vertical force to use for mounting 2 to 95 tips is interpolated from Diti_Pwm_Limit and Diti_Pwm_Limit1.

A.4 Parameters in the Evoware.inf file

The following tables list user-configurable parameters in the evoware.inf file. evoware.inf is in the <install_path>/Database directory. These settings should only be changed by specialists.

Note: *The parameters in evoware.inf are already configured with suitable values. The values should only be changed for special applications. Do not change the values of parameters which are not listed in the following tables.*

Add a new line to the respective section of the evoware.inf file if the parameter is missing.

Default values: Each parameter string is shown below with the default value of the parameter (some parameters do not have a default value). The parameter string is not case sensitive.

Note: *Freedom EVOware must be re-started for the changes to take effect.*

Configuration files are protected with checksums. When you re-start Freedom EVOware after editing this file, you will be warned that the checksum is invalid. Proceed as follows to repair the checksum:

- Quit Freedom EVOware and start the Configuration Tool with Start > All Programs > Tecan > EVOware > Configure. You will be warned again that the checksum is invalid and you will be asked if you want to repair the checksum. Click Yes. Then Click Exit and re-start Freedom EVOware. Alternatively, repair the checksum using the Validate Configuration tool (see A.9.2 “Validate Configuration Tool”, A-36).

MCA96 Wash Parameters

The sections whose name starts with “[MCA_” specify the recommended wash parameters for the MCA96 Wash command and the MCA96 Merge Plate Wizard for a variety of different MCA96 tip types.

Each tip type requires at least three sections (including the “header” section), and the sections are arranged in groups. For each tip type, the “header” section (e.g. [MCA_STD]) specifies the tip type (TipType=) and the number of wash steps which are recommended for this tip type (WashSteps=). This is followed by additional sections which contain the wash parameters for each of the wash steps (e.g. [MCA_STD_WASH1], [MCA_STD_WASH2] and [MCA_STD_WASH3]. In this example, WASH1 is the empty tips step, WASH2 is the first cleaner step and WASH3 applies to all subsequent cleaner steps, starting with the second one.

Te-MO Wash Parameters

The sections whose name starts with “[TEMO_” specify the recommended wash parameters for the Te-MO Wash command for a variety of different Te-MO tip types.

Each tip type requires at least three sections (including the “header” section), and the sections are arranged in groups. For each tip type, the “header” section (e.g. [TEMO_STD]) specifies the tip type (TipType=) and the number of wash steps which are recommended for this tip type (WashSteps=). This is followed by additional sections which contain the wash parameters for each of the wash steps (e.g. [TEMO_STD_WASH1], [TEMO_STD_WASH2] and [TEMO_STD_WASH3]. In this example, WASH1 is the empty tips step, WASH2 is the first cleaner step and WASH3 applies to all subsequent cleaner steps, starting with the second one.

A.5 Freedom EVOware Directory Structure and Files

This section describes the Freedom EVOware directory structure and its files. The following structure is used under Windows XP if you choose the installation defaults (with the English version of Microsoft Windows, the **..**\EVOware directory is normally located in C:\Program Files\Tecan):

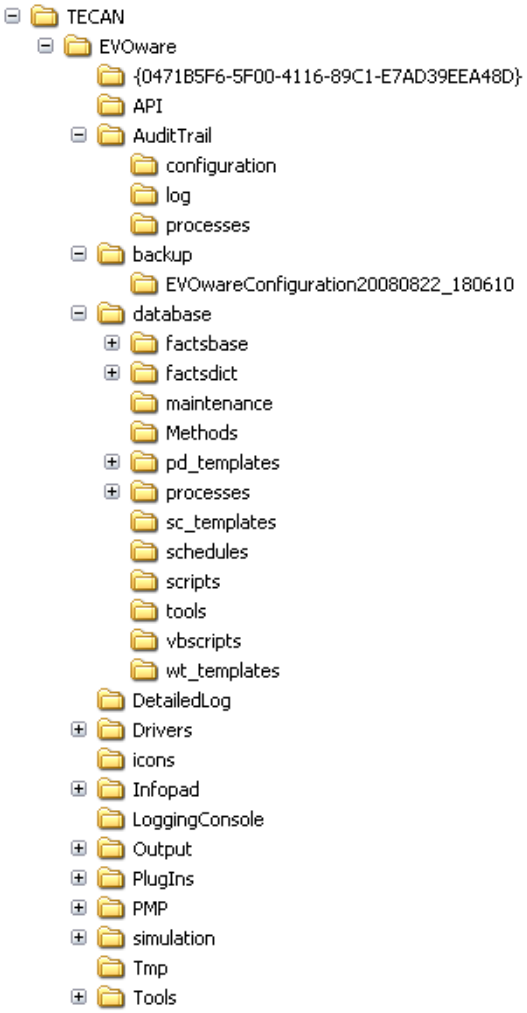


Fig. A-1 *Directory structure of c:\Program Files, Windows XP*

Under Windows Vista, Freedom EVOware stores all files whose contents can change during program runtime in the c:\ProgramData directory using the directory structure shown in the following figure. Examples of files whose contents can change includes configuration files (.ini and .xml), database files, scripts and processes.

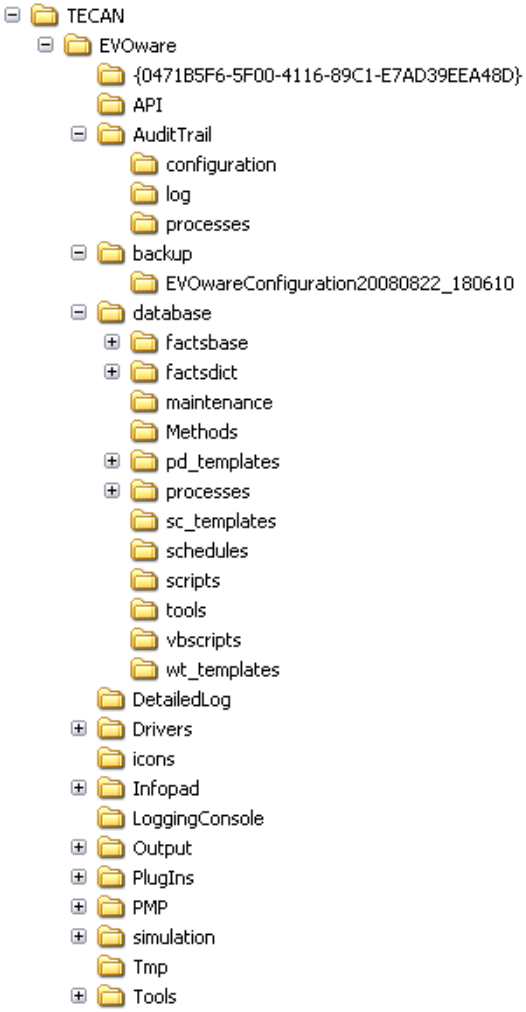


Fig. A-2 *Directory structure of c:\ProgramData, Windows Vista*

Software components such as .exe and .dll files are stored in the same directory under both Windows XP and Windows Vista.

The **C:\Program Files\Tecan\EVOware** directory contains executable files, device drivers, help files and configuration files (.ini and .xml). Evoware_gp.chm is the help file for the general purpose configuration. Evoware_ro.chm is the help file for the research only configuration.

Under **Windows Vista**, the configuration files (.ini and .xml) are stored in C:\ProgramData\Tecan\EVOware instead.

The **C:\Program Files\Tecan\EVOware\API** directory contains executable files for the Application Programming Interface.

AuditTrail directory

The **..\EVOware\AuditTrail\Configuration** directory contains earlier versions of configuration and data files. It also contains copies of the user management audit trail (see 7.1.1 “User Management Audit Trail”, 7-2).

Each time a configuration or data file is modified and saved, the previous version is stored in this directory. The date and time is appended to the original filename as follows:

name.extension.YYMMDD.HHMMSS, where YYMMDD is the date and HHMMSS is the time of the backup, e.g.: Carrier.cfg.020531.084612

If you have used the Export/Import tool to import Freedom EVOware configuration and data files, the **..\EVOware\AuditTrail** directory contains backup copies of the files which have been replaced. Freedom EVOware creates a new sub-directory for each backup. The name of the new sub-directory is ExpImpBU_YYYYMMDD_HHMMSS, where YYYYMMDD is the date and HHMMSS is the time of the backup. See A.9.4 “Export/Import Tool”, A-38.

The **..\EVOware\AuditTrail\Log** directory contains log files (see A.1 “Overview of the Log Files”, A-1). It also contains the trace file (see A.1.7 “Structure of the Trace File (Audit Trail)”, A-11). For each file except the trace file, the date and the time is included the file name. If required, you can configure an alternative location for this directory (see 8.3.1.4 “Protocol Options Tab”, 8-8).

Note: *Freedom EVOware can output a large amount of logging information. It is recommended to back up and then delete the old log files on a regular basis. They are not backed up by the Backup function - you should use the Audit Trail Archiving function instead. See A.9.6 “Audit Trail Archiving tool”, A-47.*

Note: *If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files.*

The **..\EVOware\AuditTrail\Processes** directory contains backup copies of all Freedom EVOware Plus process files which have been changed. For each file, the date and the time is included in the file name.

Under **Windows Vista**, the AuditTrail directory is stored in C:\ProgramData\Tecan\EVOware instead.

The **..\EVOware\Backup** directory contains backup copies of the Freedom EVOware configuration and data files (see 8.2 “Backing Up and Restoring Your Configuration”, 8-3). Freedom EVOware creates a new sub-directory for each backup. The name of the new sub-directory is BACKUP_YYYYMMDD_HHMMSS, where YYYYMMDD is the date and HHMMSS is the time of the backup. If required, you can configure an alternative location for this directory (see 8.3.1.4 “Protocol Options Tab”, 8-8).

Under **Windows Vista**, the default location for the Backup directory is C:\ProgramData\Tecan\EVOware\Backup.

Database directory

The **..\EVOware\Database** directory contains files which are used by Freedom EVOware internally.

The **..\EVOware\Database\factsbase** directory contains files which are used by Freedom EVOware internally.

The **..\EVOware\Database\factsdict** directory contains files which are used by Freedom EVOware internally.

The **..\EVOware\Database\Maintenance** directory contains maintenance scripts (see 6.4.2 “Run Maintenance”, 6-10).

The **..\EVOware\Database\PD_Templates** directory contains Freedom EVOware Plus process templates. Each template is contained in a separate sub-directory.

The **..\EVOware\Database\Processes** directory contains Freedom EVOware Plus processes. Each process is contained in a separate sub-directory.

The **..\EVOware\Database\SC_Templates** directory contains script templates.

The **..\EVOware\Database\Schedules** directory contains Freedom EVOware Plus schedules which you have saved.

The **..\EVOware\Database\Scripts** directory contains pipetting scripts.

The **..\EVOware\Database\Tools** directory is used to store user-created tools (executable files). The tools are assigned automatically to the Tools menu in Freedom EVOware. See 6.4.4 “Tools”, 🗎 6-11.

The **..\EVOware\Database\VBScripts** directory is used to store user-created Visual Basic scripts. The Visual Basic scripts are assigned automatically to the VB Scripts menu in Freedom EVOware. See 6.4.5 “VB Scripts”, 🗎 6-12.

The **..\EVOware\Database\wt_Templates** directory contains worktable templates.

Under **Windows Vista**, the Database directory is stored in C:\ProgramData\Tecan\EVOware\Database instead.

The **..\EVOware\Drivers** directory contains components for drivers such as the PosID-3 driver and for software add-ons such as the hit-picking wizard (see 3.1.3 “Tecan Software Add-ons for Freedom EVOware”, 🗎 3-3).

Under **Windows Vista**, configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Drivers instead.

The **..\EVOware\Infopad** directory contains components for the Infopads (see 5.4.2 “Infopads”, 🗎 5-15).

Under **Windows Vista**, configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Infopad instead.

The **..\EVOware\Icons** directory contains icons (graphic symbols).

The **..\EVOware\Output** directory is used for storing the files which are generated by the Export Data command. See 15.26 “Export Data Command”, 🗎 15-48 for information on the files which are created by this command. If required, you can specify an alternative location for this directory (see 8.3.1.4 “Protocol Options Tab”, 🗎 8-8).

Under **Windows Vista**, the default location for the Output directory is C:\ProgramData\Tecan\EVOware\Output.

The **..\EVOware\Plugins** directory contains components for software pluginms such as wizards.

Under **Windows Vista**, configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Plugins instead.

The **..\EVOware\PMP** directory contains configuration files for the Pressure Monitored Pipetting hardware option (see 17.6 “Configuring and Using PMP (Pressure Monitored Pipetting)”, 🗎 17-16).

Under **Windows Vista**, the PMP directory is stored in C:\ProgramData\Tecan\EVOware\PMP instead.

The **..\EVOware\Simulation** directory contains the 3D Simulation Tool EVOSim (if you chose to install this feature when you installed Freedom EVOware). See 3.1.4 “3D Simulation Tool for the Pipetting Instrument”, 3-3.
Under **Windows Vista**, configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Simulation instead.

The **..\EVOware\Tmp** directory is used by Freedom EVOware internally.
Under **Windows Vista**, the Tmp directory is stored in C:\ProgramData\Tecan\EVOware\Tmp instead.

The **..\EVOware\Tools** directory contains components for system tools (see A.9 “System Tools for Freedom EVOware”, A-32).
Under **Windows Vista**, configuration files from this directory are stored in C:\ProgramData\Tecan\EVOware\Tools instead.

A.6 Command Line Parameters (Freedom EVOware)

Freedom EVOware supports the following command line parameters:

Tab. A-9 *Command Line Parameters (Freedom EVOware)*

Switch	Explanation
-u <user name> -w <password>	Specify -u <user name> -w <password> to start Freedom EVOware without requiring the user name and password to be entered manually in the Login dialog box.
-sim	Start Freedom EVOware in offline mode. In offline mode, firmware commands such as movement commands are not sent to the pipetting instrument (i.e. pipetting does not take place). [a)]
-b	Start Freedom EVOware Standard instead of Freedom EVOware Plus.
-e <script_file>	Start Freedom EVOware and open an existing script (e.g. script.esc) for editing.
-r <script_file>	Start Freedom EVOware and run an existing script (e.g. script1.esc).
-e <proc_name>	Start Freedom EVOware and open an existing process for editing.
-r <proc_name>	Start Freedom EVOware and run an existing process.
-m <maint_script>	Start Freedom EVOware and run an existing maintenance script (e.g. maint1.esc).
-b -n <templ_file>	Start Freedom EVOware Standard and open the Script Editor with an empty script using the specified worktable template file (e.g. templ2.ewt).
-n <templ_file>	Start Freedom EVOware Plus and open the Script Editor with an empty script using the specified worktable template file (e.g. templ2.ewt)..
-c	Start the Configuration Tool instead of starting Freedom EVOware.

a) Freedom EVOware will switch to offline mode automatically if it cannot detect a hardlock (dongle) when it starts (see 5.1.4 “Instrument and Hardlock Detection”, 5-3).

Example

The following command line starts Freedom EVOware with the user name David and password Long and runs the maintenance script maintscript.esc:

evoware.exe -m maintscript.esc -u David -w Long

Tip: In Windows, right-click on a shortcut and choose Properties > Shortcut to assign command line parameters to the shortcut.

A.7 Freedom EVO 75 Pipetting Instrument - LiHa Configuration

The Freedom EVO 75 pipetting instrument now supports the following LiHa configurations:

- One tip.
- Two tips.
- 8 Plus 1 Access option.

Please note the following:

Two-tip LiHa

You can select either or both tips in the pipetting commands. The two tips can be used for pipetting (raised or lowered) independently. The tip spacing is fixed at 18 mm (every second well of a 96-well microplate).

8 Plus 1 Access option

You can select either tip 1 or all 8 tips in the pipetting commands. Tip 1 can be used for pipetting (raised or lowered) independently of the other 7 tips. If you select all 8 tips, they are all used (raised or lowered) together. The tip spacing is fixed at 9 mm (adjacent wells of a 96-well microplate).

In addition, liquid detection hardware is only provided for tip 1. If you want to use liquid detection, you must choose the detection mode *Detect liquid with first, tip, move others to same position* in the Global settings of the liquid class.

The 8 Plus 1 Access option is currently only intended for disposable tips (not fixed tips). In addition, you must fit the same DITI type (DITI size) to all 8 positions on the LiHa.

Tip spacing

Tip spreading is not available for the Freedom EVO 75 pipetting instrument (the tips have a fixed spacing of 9 or 18 mm depending on LiHa type). Accordingly, in the pipetting commands, you can only change the tip spacing setting for the 2-tip LiHa configuration. If the spacing between the wells you want to pipette is not 18 mm, pipetting is carried out twice using one tip at a time.

This is not possible with the 8 Plus 1 Access option. If you select all 8 tips, they are all used (raised or lowered) together. Accordingly, you cannot change the setting for tip spacing because you cannot use one tip at a time.

Tip spacing is not relevant for the 1-tip LiHa configuration.

Enhanced DITI logistics for the Get DITI command

The following method is used to minimize LiHa movements when getting DITIs (to speed up the Get DITI commands).

2-tip LiHa

If you choose both tips in the Get DITI command, they are picked up in a single movement from non-adjacent DITI rack positions. If the DITI rack is full, the first pair of tips is picked up at positions 1 and 3. The second Get DITI command picks up the tips from positions 2 and 4.

If you choose only one tip in the Get DITI command, it is picked up starting at the last position in the DITI rack (position 96) and the next single tip from position 95.

8 Plus 1 Access option

If you choose all 8 tips in the Get DITI command, they are picked up starting at the beginning of the DITI rack (positions 1 to 8). The next eight tips are then picked up at positions 9 to 16.

If you choose only one tip in the Get DITI command, it is picked up starting at the last position in the DITI rack (position 96) and the next single tip from position 95.

This method ensures that the beginning of the DITI rack always has full rows of fresh DITIs which can be picked up in a single movement.

See also 15.9 “Set DITI Position Command”, 15-15, Set Rear Counter checkbox.

A.8 Frequently Asked Questions (FAQ)

The Freedom EVOware Administrator password has been lost. Can the password be recovered or reset?

No. Freedom EVOware must be re-installed. You must backup your data before you do this.

The pipetting instrument does not react any more after an error or a robot arm crash.

Freedom EVOware has switched to offline mode (the Freedom EVOware mode is shown in the status bar). In offline mode, firmware commands such as movement commands are not sent to the instrument (i.e. pipetting does not take place). You must switch off the instrument, move the arms and devices manually to an appropriate position, switch on the instrument again, restart Freedom EVOware and initialize the instrument with the Initialize button in the toolbar.

Freedom EVOware will only start in offline mode.

The hardlock (dongle) must be attached to a USB port. The pipetting instrument must be connected to a USB or COM port on the PC. In the latter case, make sure you have correctly configured the same COM port in Freedom EVOware (see 8.4.3.3 “Com Ports Tab”, 8-36). The pipetting instrument must be switched on when you start Freedom EVOware. Note: The Freedom EVOware mode is shown in the status bar.

The script or process runs fine in offline mode and Freedom EVOware has not indicated any errors. However, the Invalid Operand error is displayed for an arm or device when the script runs in real mode.

The respective arm or device cannot carry out the required movement of one or more axes because it exceeds the mechanical limits. Check the definition of the respective carrier or labware in the Freedom EVOware configuration. Check your worktable layout to see if arm movement is obstructed by another device.

The script or process runs in offline mode and Freedom EVOware reports errors but errors are not listed in the log window or the log file.

If your script uses a barcode scanner, in offline mode you will be prompted to enter the barcode manually. Manual barcode entry is reported in the log file and is considered to be an error in this case because the barcode scanner is missing.

A Get DITIs or Te-MO Get DITIs command causes a *DITIs already mounted* error even though you haven't yet mounted any DITIs in the script.

Freedom EVOware remembers whether you still have DITIs mounted from a previous pipetting script, even if the PC has been re-started in the meantime.

The Freedom EVOware worklist specifies all eight tips but Freedom EVOware only uses the first tip.

Freedom EVOware automatically optimizes script execution by grouping together aspirate and dispense commands etc. where possible. The worklist should be written as follows if you want to use multiple tips:

A; ... (for tip 1)
D; ... (for tip 1)
W; ... (for tip 1)
A; ... (for tip 2)
D; ... (for tip 2)
W; ... (for tip 2)
etc.

It is possible to write a Freedom EVOware worklist for four standard tips and four Ditis?

No, you can only write a worklist for the same tip type. Load several worklists in your script and execute them using the *Worklist - Execute loaded worklists* command. They will be executed in chronological order of loading.

The pipetted volumes are completely wrong (too much or not enough liquid).

Check the LiHa configuration. The configured dilutor capacity must be appropriate for the tips which are mounted.

The LiHa moves to the required position but ignores aspirate and dispense commands.

In the LiHa configuration, check whether *Tip is broken* is activated (the checkbox is activated if you click the *Deactivate* button in the Diluter Error dialog box). Check the checkbox(es) to enable the pipetting channel(s) again.

The trailing airgap (TAG) is aspirated with the tips still in the liquid.

The trailing airgap is aspirated at the Z-position specified in the liquid class with *Retract tips to*. A Z-position relative to the liquid level requires liquid level detection and can not be used if you are carrying out septum piercing (the septum interferes with the capacitance-based detection system).

A.9 System Tools for Freedom EVOware

The Freedom EVOware installation program also installs the following system tools:

***Tab. A-10** Tools for system configuration and export/import*

Tool	Purpose
Configure	Freedom EVOware Configuration Tool (see 8 “Configuration Tool”, 🗎 8-1). This tool can also be accessed from the Freedom EVOware toolbar.
Data Explorer	This tool is used to check whether Freedom EVOware configuration and data files have valid checksums, to display user comments (electronic signatures feature) and to show information on modifications to these files (see A.9.1 “Data Explorer Tool”, 🗎 A-35).
Validate Configuration	This tool is used to check whether the Freedom EVOware configuration files have valid checksums and to repair the checksums if necessary (see A.9.2 “Validate Configuration Tool”, 🗎 A-36).
Duplicate Device	This tool is used to create additional copies of the Freedom EVOware device drivers if you want to connect more than one device of the same type to your pipetting instrument. See A.9.3 “Duplicate Device Tool”, 🗎 A-36.
EVOSim	3D simulation tool for visualizing the movements which are carried out by the arms of the Freedom EVO pipetting instrument (see A.14 “Configuring and Using the 3D Simulation Tool EVOSim”, 🗎 A-103).
Export/Import	This tool is used to exchange processes and scripts, robot vectors and liquid class, carrier and labware definitions with other Freedom EVOware installations (see A.9.4 “Export/Import Tool”, 🗎 A-38).
Zip & Send tool	This tool allows you to select one or more Freedom EVOware log files and/or INI files containing configuration settings and to send them by eMail to a specified recipient (see A.9.5 “Zip & Send Tool”, 🗎 A-42).
Audit Trail Archiving tool	This tool is used to archive Freedom EVOware log files and audit trail data either manually or automatically (see A.9.6 “Audit Trail Archiving tool”, 🗎 A-47).
EVOTransfer tool	This tool allows you to package up and compress an entire EVOware installation into a single, special transfer file (image file). You can then send it by email or ftp and install it on another PC (see A.9.7 “EVOTransfer”, 🗎 A-50).
Gemini Migration	This tool is used to import carrier, labware and liquid class definitions from the Gemini software. It also imports the Gemini worktable, Gemini pipetting scripts and VBScripts (see A.9.8 “Gemini Migration Tool”, 🗎 A-54). The imported configuration data replaces all existing Freedom EVOware configuration data, which is no longer available.
Shutdown EVOware drivers	This tool is used to unload the Tecan drivers when Freedom EVOware is no longer running (see A.9.9 “Shutdown EVOware drivers”, 🗎 A-55).

Tab. A-10 *Tools for system configuration and export/import (cont.)*

Tool	Purpose
IQ Wizard	This tool checks that the Tecan software components are correctly installed and guides you through the initial setup of your pipetting instrument in Freedom EVOware (see A.9.10 “IQ Wizard”, A-55).
Registration Wizard	This tool collects information on all of the Tecan software components which are installed on your PC and sends it to Tecan using one of three methods (direct online, email or file (see A.9.11 “Registration Wizard”, A-63).
Import vCards	This tool is used to import user information into the Tecan User Management System (user database) from vCard files (see A.9.12 “Import vCards Tool”, A-68).
Version Checker	This tool is used to check the versions of the installed device drivers (see A.9.13 “Version Checker Tool”, A-70).
LogViewer	This tool is used to view, filter and search for messages which have been received by the Tecan Logging Server (see A.10 “LogViewer Tool”, A-72).
ASTM Interface Module	This tool is to transfer data from Freedom EVOware to a LIMS system (see A.13 “ASTM Interface Module”, A-90). The installer for this tool is provided on the Freedom EVOware installation CD.

Most of the above tools are provided with shortcuts in Start > All Programs > Tecan > EVOware > Tools. Refer to the description of each tool for further information. The Audit Trail Archiving tool can also be started from the Configuration Tool.

When you start these tools, you will be prompted to enter your Freedom EVOware user name and password.

Note: *You can only use these tools if you have been given Freedom EVOware Administrator or Application Specialist access rights.*

Optional Tools Not Listed Above

The following tools are provided on the Freedom EVOware installation CD and must be installed separately:

The ASTM Interface Module provides a standardized software interface to laboratory information management systems (LIMS) from third-party suppliers (see A.13 “ASTM Interface Module”, A-90).

The Tecan Driver Installer is used to create an installation program (setup package) for installing custom device drivers (drivers which are not included in the Freedom EVOware installation program (see A.11 “Tecan Driver Installer”, A-80).

A.9.1 Data Explorer Tool

This tool is used to check whether Freedom EVOware configuration and data files have valid checksums, to display user comments (electronic signatures feature) and to show information on modifications to these files.

An incorrect checksum indicates that the file may be corrupted or has been modified outside of Freedom EVOware by another program or process. Invalid checksums of Freedom EVOware configuration files can be repaired with the Validate Configuration tool (see A.9.2 “Validate Configuration Tool”, A-36).

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools:

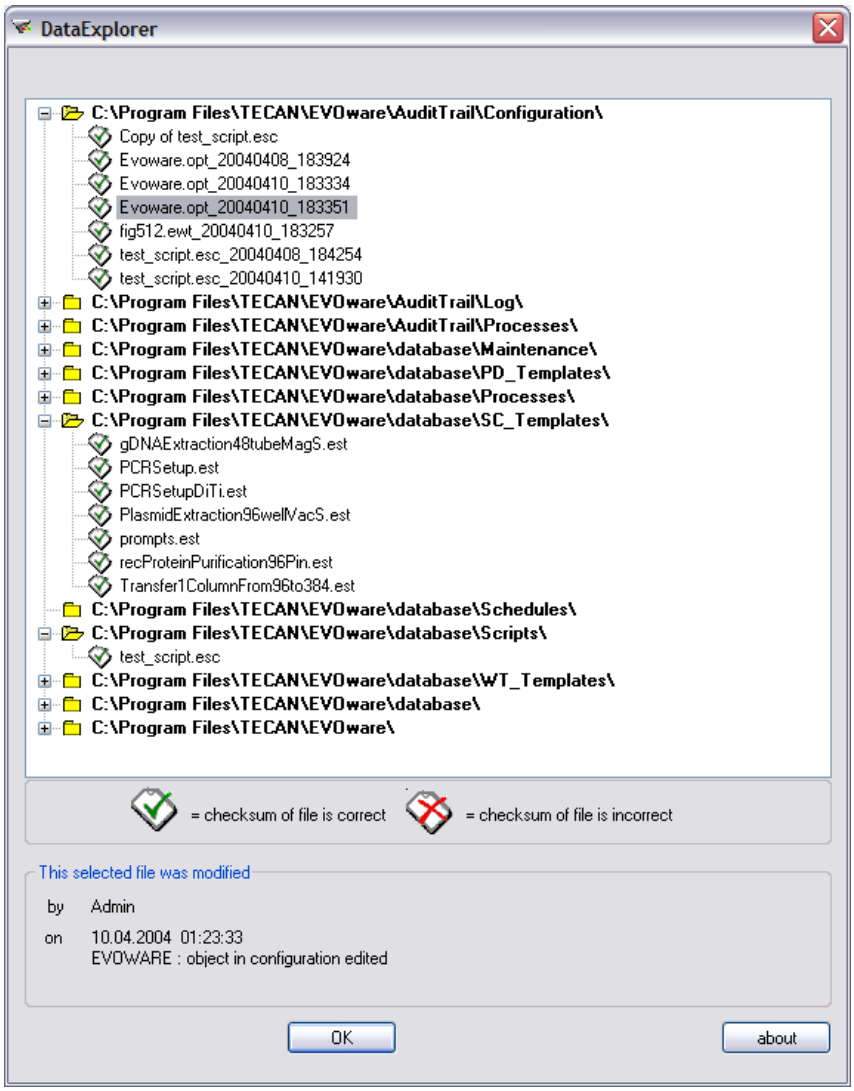


Fig. A-3 *Data Explorer tool*

In Freedom EVOware, a warning is shown if an attempt is made to load a file with an incorrect or missing checksum. The user can then choose to load the file or cancel. In the latter case, Freedom EVOware aborts with the exception of script files. In this case, the file is not loaded but Freedom EVOware remains running. The incorrect checksum warning can be disabled in the Settings dialog box by a

user with Administrator rights (see 8.3.1.4 “Protocol Options Tab”, 🗎 8-8). An entry is written to the log file each time an incorrect or missing checksum is found.

If you select a configuration or data file in the Data Explorer, the date and time of the last modification to the file will be shown alongside the name of the user who modified it.

The Data Explorer also shows a user-specified reason for the change (if the Electronic Signatures feature is enabled in the Freedom EVOware Configuration Tool). See B.5.5 “Electronic Signatures”, 🗎 B-9 for additional information on this feature.

If one of the above changes has been made automatically by Freedom EVOware, a comment is inserted which starts with “EVOware:”

A.9.2 Validate Configuration Tool

This tool is used to check whether the Freedom EVOware configuration files have valid checksums and to repair the checksums if necessary.

Some of the advanced configuration settings for Freedom EVOware can only be made by editing the evoware.opt or evoware.inf files. If you edit these files manually, it will be necessary to repair the checksums afterwards.

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools.

You will be shown a list of configuration files. A green icon indicates that the checksum is correct. A red icon indicates that the checksum is not correct and needs to be repaired.

To repair the checksum or checksums click the large green arow at the bottom right. You will be presented with the Login dialog box. Enter your user name and password and click OK. You can only repair the checksum(s) if you have been given Freedom EVOware Administrator or Application Specialist access rights. If you repair checksums, this is logged to the trace.txt file.

A.9.3 Duplicate Device Tool

if you want to use more than one physical device of the same type on your pipetting instrument, you must use the Duplicate Device tool to create one or more copies of the Freedom EVOware device driver and device configuration settings. Please exit Freedom EVOware before using this tool.

The additional device should then appear in the Control Bar (Commands section) when you re-start Freedom EVOware. If it doesn’t, make sure that the Start checkbox is checked for the device in the Configuration Tool (see 8.4.1.1 “Device Information Tab”, 🗎 8-21).

After duplicating the device driver, you must create a carrier for the new device. To do this, right-click on the carrier for the original device in the Labware section of the Control Bar and choose Duplicate from the context menu.

The new device must then be assigned to the new carrier. To do this, choose the new device (e.g. Shaker2) from the *Device* pull-down list in the Edit Carrier dialog box (see 9.5 “Configuring Carriers”, 🗎 9-39). Each device must only be assigned to one carrier.

Note: *Freedom EVOware allows you to sub-divide the carousel, incubator and Te-Stack into several logical devices. You do not need to use the Duplicate Device tool to do this (see Logical Devices in the Index for more information).*

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools. You are prompted to choose the device you want to duplicate:

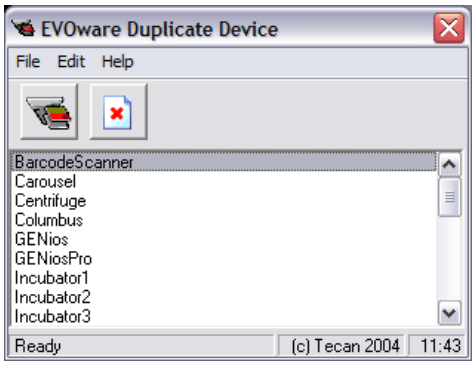


Fig. A-4 *Duplicate Device tool*

Click the *Clone* button in the toolbar. You will be prompted to confirm your choice:

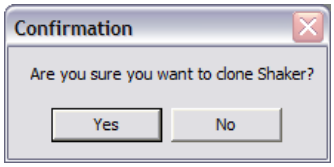


Fig. A-5 *Confirmation dialog box*

If you click Yes, you must then make the following settings for the new device driver:

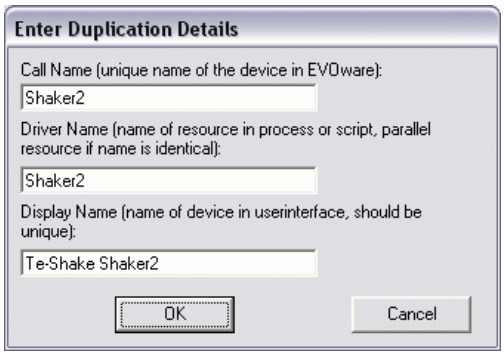

Enter Duplication Details
Call Name (unique name of the device in EVOware):
Shaker2
Driver Name (name of resource in process or script, parallel resource if name is identical):
Shaker2
Display Name (name of device in userinterface, should be unique):
Te-Shake Shaker2
OK
Cancel

Fig. A-6 *Enter Duplicate Details dialog box*

Call name

This field specifies the device name which used by Freedom EVOware internally. The call name is also used for labeling the process step in the Process Editor. A suitable name will be suggested. You can specify a different name if required. Call names must be unique.

Driver Name

This field specifies the name of the device driver. A suitable name will be suggested. You can specify a different name if required.

If you specify the same driver name as the one you copied, Freedom EVOware Plus treats them as a parallel resource, and the scheduler will automatically choose one of the physical devices during process runtime, depending on which one is free. The parallel resources should normally be configured to function identically (e.g. same washing liquid or same incubation temperature).

Parallel resources are not relevant in Freedom EVOware Standard.

Display Name

Specify the required name for the device in the Control Bar. It is recommended to choose a unique, descriptive display name (e.g. Te-Shake 2 or Te-Shake 90 degrees).

If you want to delete a device driver, select the driver in the list and click the *Delete* button in the toolbar . You will be prompted to confirm the deletion.

Note: *If you delete all copies of the device driver, you must re-install the device with the installation program if you want to use the device again later.*

A.9.4 Export/Import Tool

This tool is used to exchange processes and scripts, robot vectors and liquid class, carrier and labware definitions with other Freedom EVOware installations.

In contrast to earlier Tecan pipetting software products such as Gemini, you must not simply copy the carrier database file carrier.cfg from one Freedom EVOware installation to another. You must use the Export/Import tool instead.

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools (please exit Freedom EVOware first):

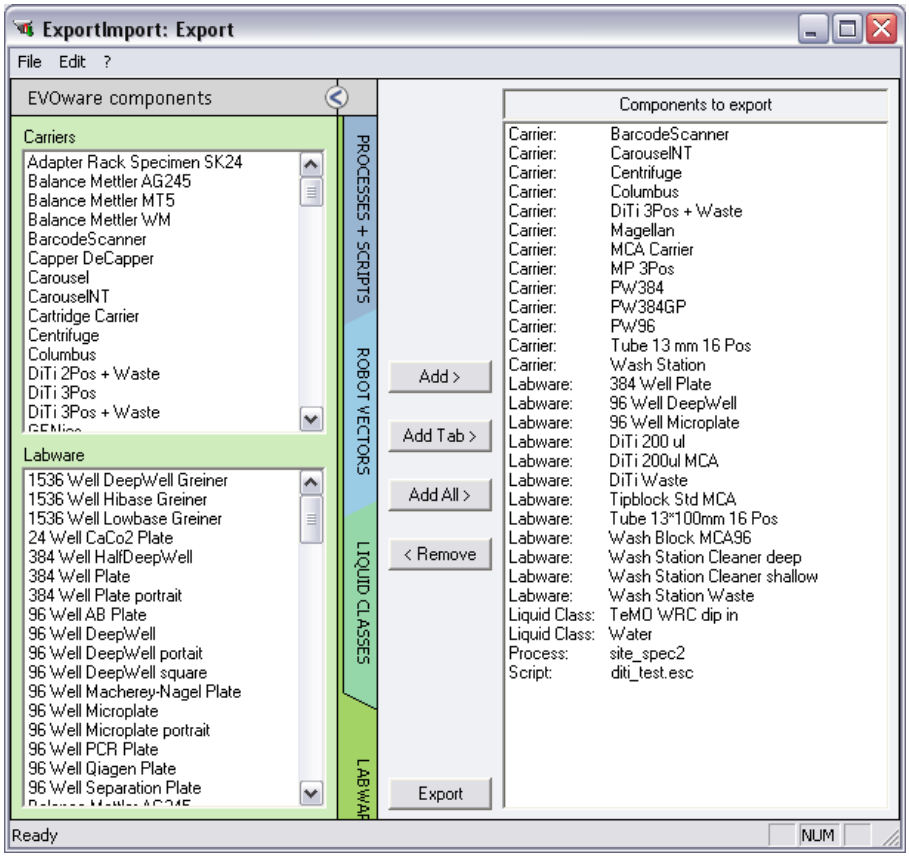


Fig. A-7 *Export/Import tool*

When you start it, the Export/Import tool is initially in export mode, as shown by the *Export* button at the bottom.

A.9.4.1 Exporting

Choose individual items you want to export using the *Add* and *Remove* buttons and the four coloured tabs. Click *Add Tab* to export all of the items on the currently selected tab. Click *Add All* to export all of the items on all of the tabs.

Thie chosen items will be shown in the right hand panel.

If you choose to export a script or process, the Export/Import tool will automatically add all of the labware, carriers and liquid classes which are used to the right hand panel. Use the *Remove* button to remove un-needed items from the right hand panel if required.

The icons in the left hand panel of the Liquid Classes tab indicate whether the liquid classes are pre-defined ( ) or custom ( ).

When you have made your choices, click the *Export* button to create an export file (*.exd) which contains the chosen items. The export file will also contain the xml data which is needed by the PMP (Pressure Monitored Pipetting) hardware option.

To switch to import mode, choose *Load import file* in the File menu and choose a previously created export file (*.exd). The *Export* button at the bottom changes to *Import*. A dialog box will be shown if script and process files with the same names already exist. You can then choose to skip the file(s) or overwrite the existing file(s). Click the Import button when you are ready to import.

Please exit Freedom EVOware before using this tool.

A.9.4.2 Importing

Choose *Load import file* in the File menu to load a previously created export file (*.exd) which contains the processes and scripts, robot vectors and liquid class, carrier and labware definitions you want to import.

Alternatively, if the Export/Import tool is not already running, double-click on the required *.exd file to start the tool and switch to import mode. You will be prompted to enter your user name and password.

A dialog box will appear if one or more items already exist in your Freedom EVOware installation with the same name. The dialog box shows the name of the offending item and lets you choose how to treat existing items:

- Skip this item: Do not import this item.
- Skip all items: Do not import any of the items in the export file.
- Include this item: Add the item to the list in the right hand panel even though it already exists.
- Include all items: Add all items in the export file to the list in the right hand panel even though some of them already exist.

After processing the export file, the right hand panel shows all of the items you have chosen to import. Click Import all to import all of the items in the list. Items which already exist in your Freedom EVOware installation (if any) will be overwritten. Alternatively, select an item and click Import to import the selected item only.

A.9.4.3 File menu

Load import file

Choose a previously created export file which contains the processes and scripts, robot vectors and liquid class, carrier and labware definitions you want to import. See A.9.4.2 “Importing”, A-40.

Undo previous import...

If you have used the Export/Import tool to import Freedom EVOware configuration and data files, backup copies of the files which have been replaced are made in the <install_path>/AuditTrail/Configuration directory.

Choose *Undo previous import* if you decide to restore the earlier versions of the configuration and data files. A dialog box is shown to allow you to choose the backup copy to restore. This function only restores backups made by the Export/Import tool, not those made by the Backup feature. See also 8.2 “Backing Up and Restoring Your Configuration”, 8-3.

A.9.4.4 Edit menu

Switch to export

Unload a previously loaded import file, cancel import mode and switch to export mode. Use this option if you have started to import but change your mind and want to export instead. This menu item is only available in import mode.

Add files to export list

Choose a file of any required type which you want to include in the export file. For example, you can include a worklist file, a VB script or a text document with instructions on using the export file. This menu item is only available in export mode.

During the subsequent import operation, the file will be put in a directory of the same name from where it was exported. The user will be prompted if the file already exists on the destination PC or if the directory does not exist.

A.9.4.5 Command Line Parameters (Export/Import Tool)

The Export/Import Tool supports the following command line parameters:

Tab. A-11 *Command Line Parameters (Export/Import Tool)*

Switch	Explanation
-u <user name> -w <password>	Specify -u <user name> -w <password> to start Freedom EVOware without requiring the user name and password to be entered manually in the Login dialog box. [a)]
-a	Automated mode (no user interaction, no GUI)
-e	Export mode
-s	Skip existing items on import (in automated mode only)
-o	Overwrite existing items on import (in automated mode only)
-k <Secret Key>	Secret key allowing login without user name and password (e.g. for Installer)
-v	Verbose mode (extended logging)
<Import file>	Full path and filename of export/import file (EXD file). In import mode, this file is loaded; in export mode, it is generated.
<Item> *	List of items to be exported, separated by spaces (in export mode only).

a) The login dialog box is also skipped if the User Management has been disabled in the EVOware Configuration Tool.

The command line parameters are evaluated and handled as follows:

- If both user name and password are specified, the login is performed automatically.
- If the correct secret key is specified, the login dialog is skipped.
- If the automated mode option is specified, the options -s and -o are accepted. If none of the latter two is specified, existing items are skipped on import (i.e. -s is default behaviour).
- If the automated mode option is specified, an import file has to be specified as well; otherwise the tool starts in normal mode.
- If the export mode switch has been specified, a list of items to be exported has to be provided as well as the export file name.
- In import mode, the list of items - if provided - is ignored.

A.9.5 Zip & Send Tool

To help with diagnosing problems with your Freedom EVOware installation, the Tecan pipetting instrument and optional hardware such as the Carousel, the Customer Support hotline at Tecan may ask you to send them a set of log files from the core software, the Message Control Server and/or the device drivers.

The Zip & Send tool allows you to configure Freedom EVOware to create the required log files and to send them by eMail to a specified recipient.

Some of the log file types are always created by Freedom EVOware, other log file types (such as log files from device drivers) need to be explicitly activated. In addition, the Zip & Send can configure the Message Control Server (MCS) to output log files with five different levels of logging detail, according to requirements.

Proceed as follows to use Zip & Send:

- Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools.
- Choose the log files which are needed and the required level of detail for the MCS log.
- Click the large green arrow in the “Activate Logging window”. This configures Freedom EVOware to start recording the chosen log files. In addition, Zip & Send is minimized to an icon the system tray area at the bottom right edge of the screen.
- Use Freedom EVOware in the normal way, at least until the event or error which you want to record has occurred. Zip & Send must remain running (in the background or foreground) during this time.
- Maximize the Zip & Send window (right-click the Zip & Send icon in the system tray and choose Show application).
- Click Send to proceed to the “Send Log Files window”.
  The buttons in the Send Log Files window allow you to reach the “Mail Setup window”, the “Choose Data To Send window” and the “Edit Recipients window”.
- In the Send Log Files window, choose the required recipient(s) and click the large green arrow on the right to send the log files via eMail. The selected logging information is compressed to a zip file and sent as an eMail attachment.
  - The name of the zip file which is created is ZipAndSend.zip. It is created in the ..\EVOware\DetailedLog directory. It is overwritten each time you use Zip & Send.
  - If you do not specify any eMail recipients, ZipAndSend.zip will be created but not sent. If the Freedom EVOware PC does not have an internet connection, transfer the zip file to another PC with an internet connection (e.g. using a USB stick) and send the zip file using an eMail package such as MS Outlook.
  - The zip file will be large if you have chosen to send lots of data (e.g. if you include Freedom EVOware database directory). In this case, sending the eMail may take several minutes. Zip & Send does not react to user input while the eMail is being sent.
  - Zip & Send writes a log file of its actions to the ..\EVOware\AuditTrail directory. The last line of this file indicates whether the eMail was sent sucessfully.
  - All settings for Zip & Send (e.g. eMail recipients) are stored in the ZipAndSend.ini file in the ..\EVOware directory.
- In the Send Log Files window, click Close to return to the Activate Logging window.

- In the Activate Logging window, click Close to exit Zip & Send. This restores all of the log file settings to the settings which were present before you ran Zip & Send. Alternatively, click Restore to restore the log file settings without exiting Zip & Send.

Note: *If Freedom EVOware did not shut down properly the last time it was used, you will be asked if you want to run Zip & Send when you restart Freedom EVOware again. The log files which are sent in this case can be useful to the Customer Support hotline when diagnosing problems, for example if the incorrect shutdown was caused by an internal error in Freedom EVOware and not by an external event such as loss of mains power to the PC.*

A.9.5.1 Activate Logging window

This window is used to choose the log files which are needed and the level of detail for the MCS log:

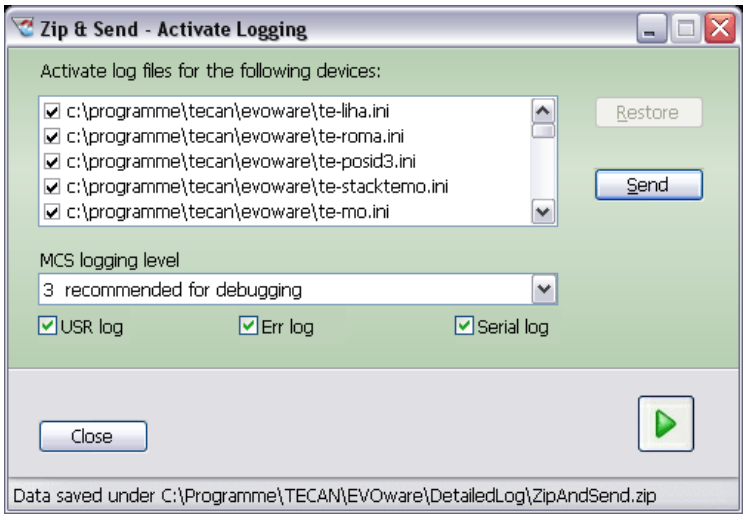


Fig. A-8 *Zip & Send - Activate Logging window*

When you first start Zip & Send, all available driver log files and EVOware log files are selected. Uncheck the checkboxes for the files which you don't want or need to send.

Freedom EVOware always creates log files of type EVO. See A.1.2 "Structure of Log Files of Type USR", A-9 and A.1.3 "Structure of Log Files of Type ERR", A-9 for information on activating the other two log file types.

Check the *Serial log* checkbox to include serial data (instrument firmware commands) in the EVO log file type.

Choose the required logging level for the Message Control Server (MCS) from the pull-down list. A logging level of "3" is normally sufficient. Levels higher than "3" can result in very large MCS log files in a short period of time.

If you activate log files for devices, you must also check the *Driver log files* checkbox in the Choose Data To Send window. Otherwise, the log files will be recorded but not included in the zip file and not sent. This applies analogously to the other log file types.

Click the large green arrow to start recording the chosen log files. This minimizes Zip & Send to an icon the system tray area at the bottom right edge of the screen.

Alternatively, click Send to proceed to the "Send Log Files window".

Click Restore to restore all of the log file settings to the settings which were present before you started Zip & Send.

Context menu in the system tray

When Zip & Send is minimized, right-click the Zip & Send icon in the system tray area at the bottom right edge of the screen to open the context menu. The available options are as follows:

Restore settings: Restore all of the log file settings to the settings which were present before you started Zip & Send.

Activate logging: Activate the log file settings which you configured in the Activate Logging window. This option only appears if you previously chose Restore Settings. Activate logging and Restore Settings can be used to switch logging on and off and thus record and send only the log file information which is relevant. This reduces the size of the data which is sent.

Send all: This opens the Send Log Files window and selects all available items in the Choose Data To Send window (ignoring a previous selection which you made).

Close application: Exit Zip & Send.

Show application: This opens the Activate Logging window again.

A.9.5.2 Send Log Files window

The Send Log Files window is used to send the log files via eMail:

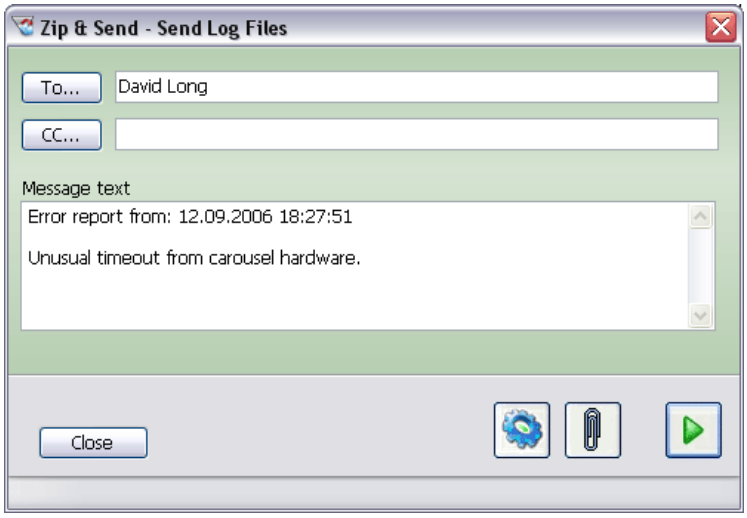


Fig. A-9 *Zip & Send - Send Log Files window*

Click **To...** to open the "Edit Recipients window", which allows you to choose recipients from the Zip & Send eMail Address Book. Alternatively, you can enter an eMail address in the field provided. Use semicolons ";" to separate multiple recipients.

Click **CC...** (carbon copy) to open the "Edit Recipients window", which allows you to choose recipients from the Zip & Send eMail Address Book. Alternatively, you can enter an eMail address in the field provided. Use semicolons ";" to separate multiple recipients.

If you do not specify any eMail recipients, ZipAndSend.zip will be created in the ..\EVOware\DetailedLog directory but not sent. If the Freedom EVOware PC does not have an internet connection, transfer the zip file to another PC with an internet

connection (e.g. using a USB stick) and send the zip file using an eMail package such as MS Outlook.

Click to open the “Mail Setup window”.

Click to open the “Choose Data To Send window”.

A.9.5.3 Mail Setup window

The eMail Setup window is used to configure the settings for your eMail account:

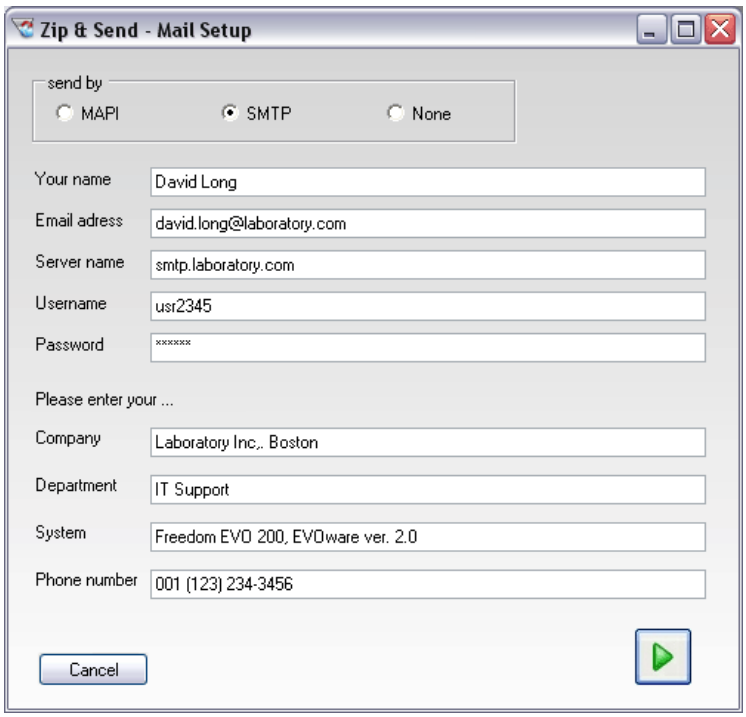


Fig. A-10 *Zip & Send - eMail Setup window*

The settings you make are stored in the Zip & Send configuration. This dialog box is only need when you use Zip & Send for the first time, or if your eMail settings have changed.

Send By panel

Specify your name and eMail address, your company name, department name and phone number. Provide information on your Freedom EVOware system in the System field.

MAPI

Click this radio button to send the eMail via MAPI. When you send the mail, you will be prompted to enter the MAPI profile you want to use and the MAPI password. You can get a list of available MAPI profiles by double-clicking the Mail button in the Windows Control Panel. The Mail button will only be present in the Control Panel if you have installed the MAPI service. MAPI is included with many eMail programs, e.g. Microsoft Outlook.

SMTP

Click this radio button to send the eMail via SMTP. The following fields are also required in this case.

Server name: Specify the address of the SMTP server you want to use for sending the eMails.
User name: Specify the user name for SMTP authentication.
Password: Specify the password for SMTP authentication

The user name and password for SMTP authentication depends on the SMTP server. In many cases, it is the same user name and password which is used to collect eMails using the POP3 protocol.

None

Click this radio button if you want to collect the data but do not want to send it by eMail. You can then transfer the zip file to another PC manually, e.g. using a USB stick or through a network connection.

A.9.5.4 Choose Data To Send window

The Choose Data To Send window is used to choose the files and other data which you want to send:

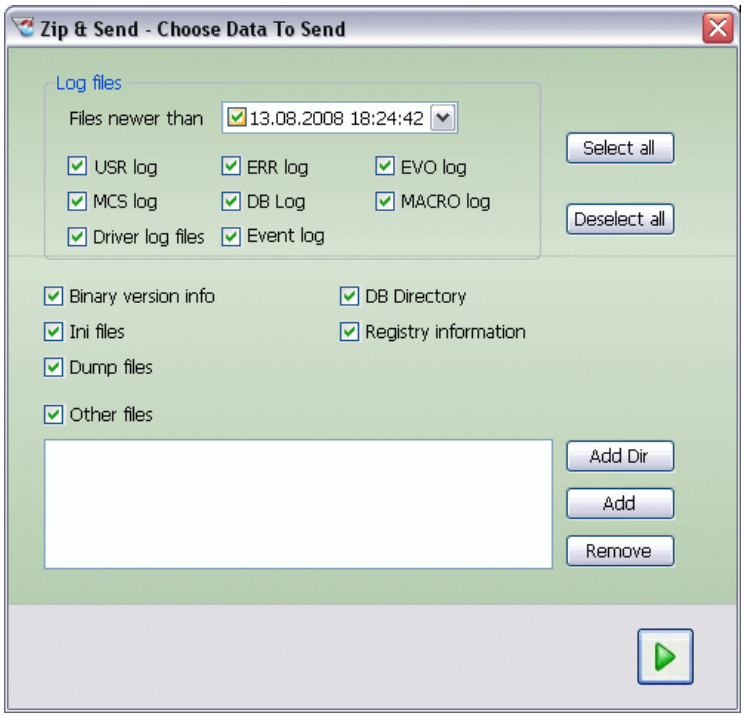


Fig. A-11 *Zip & Send - Choose Data To Send window*

When you first use Zip & Send, all available driver log files, EVOware log files and other data items are selected (the checkboxes for USR and ERR log will be unchecked if you did not select them in the Activate Logging window).

Uncheck the checkboxes for the data which you don't want or need to send.

Use the Files newer than pull-down list to only send files which are newer than a specified date.

See A.1 "Overview of the Log Files", A-1 for information on the log file types USR, ERR and EVO.

Check the Binary version info checkbox to send version info on EVOware software components and drivers.

Check the DB checkbox to send the EVOware database directory. This directory can be quite large. If you select this item, sending the eMail may take longer than expected.

Check the INI checkbox to send INI files. INI files contain configuration settings for EVOware software components and drivers.

Check the Registry checkbox to send that part of the Windows registry which is used by EVOware. The registry contains configuration settings for EVOware software components and drivers.

Check the Other files checkbox and choose the file(s) using the buttons to send other files such as descriptions of the problem which you made using a text editor program.

The settings you make are stored in the Zip & Send configuration.

A.9.5.5 Edit Recipients window

The Edit Recipients window is used to configure recipients for the Zip & Send eMail Address Book:

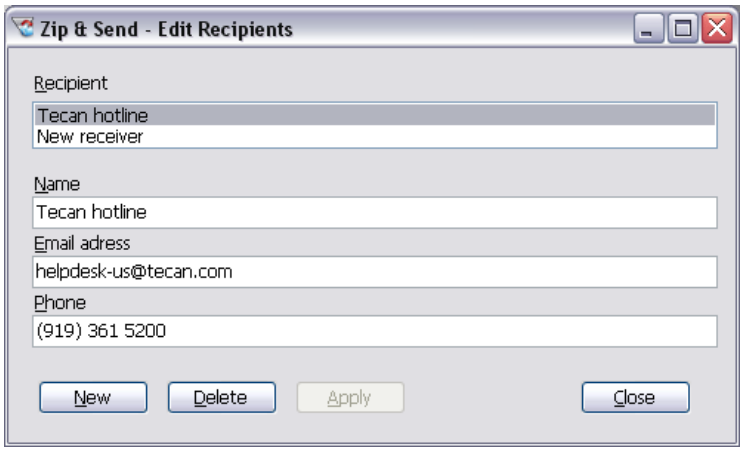


Fig. A-12 *Zip & Send - Edit Recipients window*

Click New to add a new recipient to the Zip & Send address book. Then fill in the fields and click Apply. Phone is the recipient's phone number; this field is for information purposes only.

Double-click on an entry in the Recipient list to add it to the **To...** or **CC...** field in the Send Log Files window.

A.9.6 Audit Trail Archiving tool

Freedom EVOware can output a large amount of logging information. It is recommended to back up and then delete the old log files on a regular basis. The Audit Trail Archiving tool (AuditArch) allows you to archive Freedom EVOware log files and audit trail data either manually or automatically.

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools. The Audit Trail Archiving tool can also be started from the Configuration Tool.

If you checked the *Start AuditArch at EVOware startup* checkbox in the Configuration Tool, AuditArch will start in the background each time you start

Freedom EVOware and archive the log files if this is required by the currently configured archiving actions (see 8.3.1.4 “Protocol Options Tab”, 8-8, Audit Trail Archiving panel).

Note: *If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files.*

The log files and audit trail data are located in the <install_path>\AuditTrail directory and its sub-directories. These directories are protected against unauthorized access. AuditArch allows you to copy or move the log files and audit trail data files to another directory of your choice.

The AuditArch dialog box is as follows:

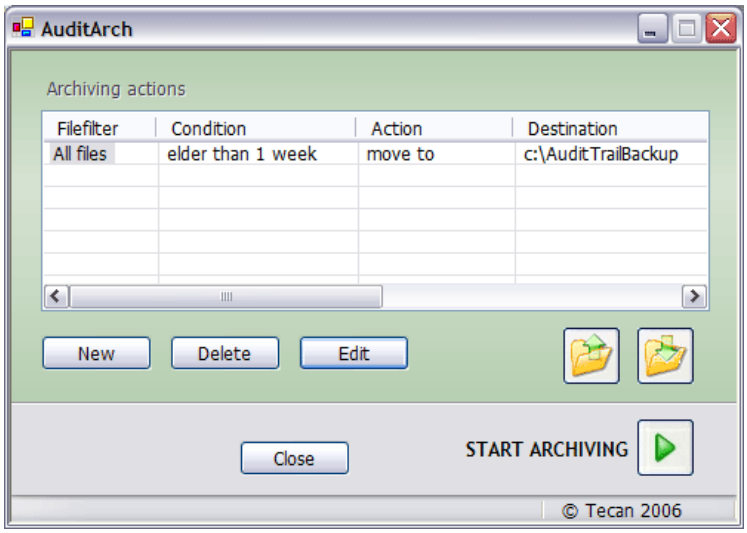


Fig. A-13 *Audit Trail Archiving tool*

Click *New* to create a new archiving action. Click *Delete* to delete an existing archiving action.

Click the yellow buttons on the right to:

- Save the current set of archiving actions in a .aal file, and
- Open a previously stored set of archiving actions.

Click the large green arrow on the right to start the archiving procedure manually using the currently configured archiving actions.

Click *Edit* to configure the selected archiving action. This opens the Edit Archiving Action dialog box:

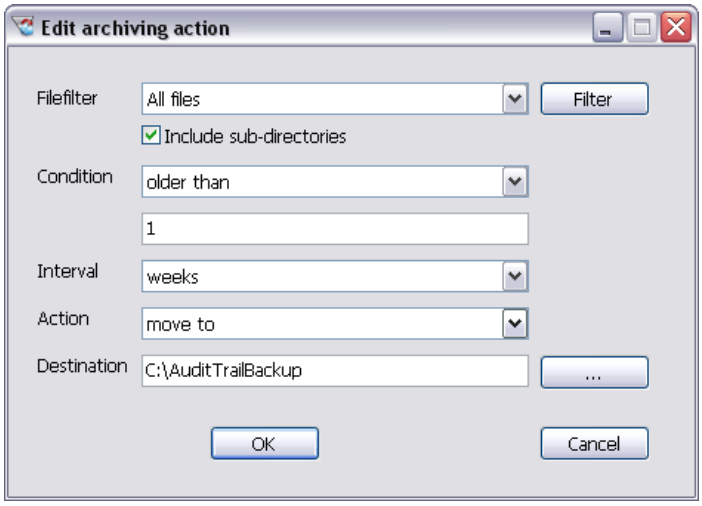


Fig. A-14 *Editing an archiving action*

Choose the files you want to archive with this archiving action by choosing a file filter from the FileFilter pull-down list. Choose *All files* to archive all log files and audit trail data. Click *Filter* to create or edit a file name filter in the *Edit Filter* dialog box (see below).

Check the *Include sub-directories* checkbox if you want the file name filter to apply to log files in sub-directories of the ../AuditTrail directory as well.

You can also choose when you want to archive the files (e.g. when they have reached a specified age) and the action to take (move or copy them to the specified destination directory or delete them).

Note: *If you are required to comply with the FDA regulations, make sure you keep archive copies of all audit trail, trace and log files. Do not delete them from the ../AuditTrail directory without making an archive copy, which should be kept as a permanent record.*

Edit Filter dialog box

The Edit Filter dialog box lets you specify the files to archive using wildcards:

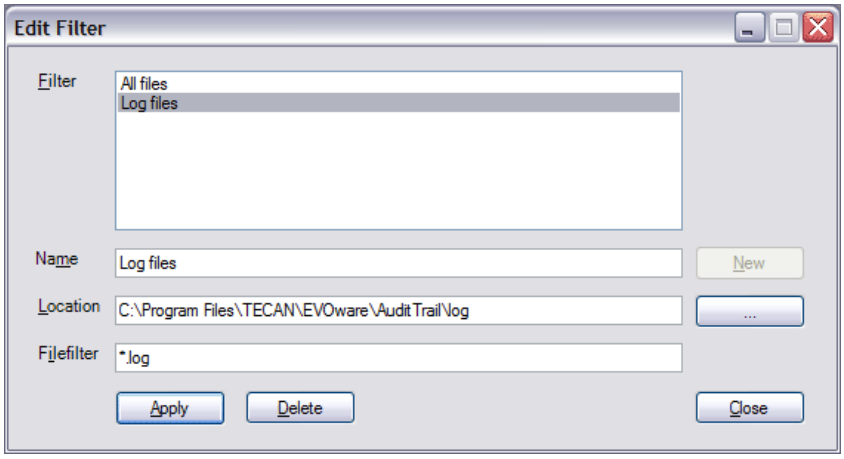


Fig. A-15 *Edit Filter dialog box*

To create a new filter, enter a name for the filter in the Name field, click New, specify the filter settings and click Apply. Click Close when you are finished.
The new filter can then be chosen from the FileFilter pull-down list in the *Edit archiving action* dialog box.

A.9.7 EVOTransfer

This tool allows you to package up and compress an entire EVOware installation into a single, special transfer file (image file). You can then send it by email or ftp and install it on another PC. You can also use EVOTransfer to make an image of several different EVOware installations. If you copy several image files to the same PC, you can then use EVOTransfer to switch between different configuration scenarios or even different EVOware versions for the purpose of demonstration, testing or technical support.

Note: *You cannot use EVOTransfer to transfer an EVOware installation from a PC running Windows XP to a PC running Windows Vista or vice versa.*

Note: *To use the EVOware installation for pipetting, the recipient also needs to have a suitable Freedom EVOware dongle.*

To install EVOTransfer on a PC which is running an older Freedom EVOware version (e.g. v 1.4), copy the following files from the EVOware\Tools\EVOTransfer directory in the Freedom EVOware 2.3 installation to a local directory of your choice on the other PC: EVOtransfer.exe, EVOtransfer.ini, ICSharpCode.SharpZipLib.dll and Win32Security.dll (or copy the whole directory). It is not necessary to run a setup program.
Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools:

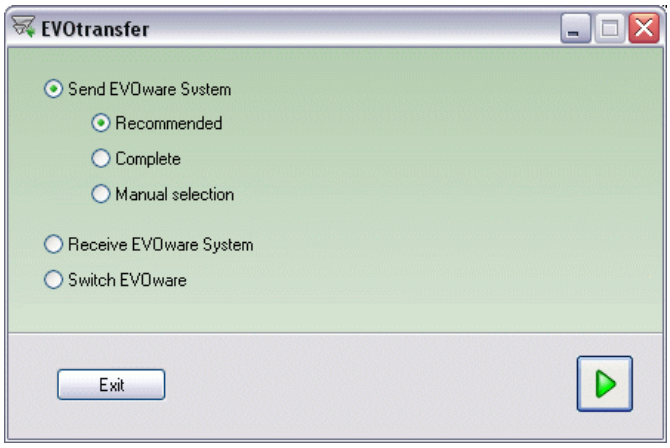


Fig. A-16 *EVOTransfer - Main window*

The options in this dialog box are as follows:

Send EVOware System

This option collects the files to send from your Freedom EVOware installation and packs them into a single compressed transfer file (.etz) in the EVOware installation directory:
Recommended: Only collect and compress the files which are normally required to recreate your Freedom EVOware installation on the remote

system.
Complete: collect and compress all of the files from your Freedom EVOware installation
Manual selection: Choose the files manually which you want to send.

Receive EVOware System

Prepare to install a Freedom EVOware installation from a transfer file which is on your hard disk. You also have the option of getting a transfer file from an ftp server.

Switch EVOware

Replace the currently installed Freedom EVOware installation on your PC with another Freedom EVOware installation which is contained in a transfer file.

Click the green arrow when you have made your choice.

A.9.7.1 Send EVOware System

If you choose Send EVOware System, a progress bar is shown while collecting and compressing the files.
You are then shown the following dialog box:

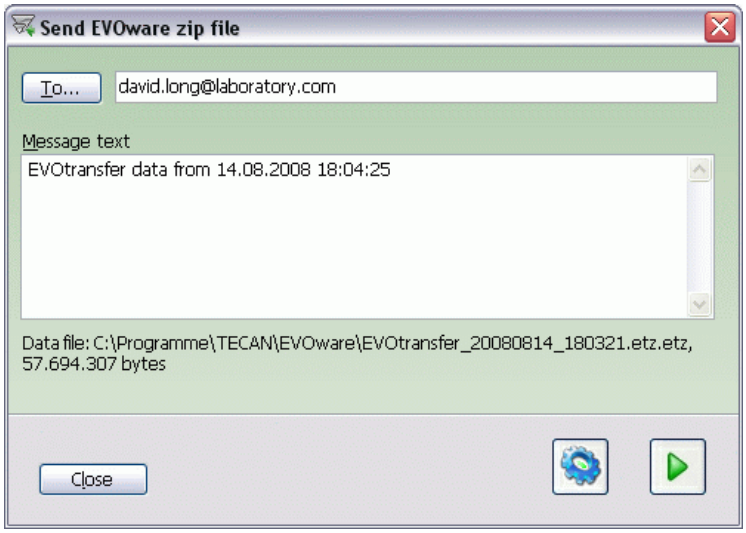


Fig. A-17 *EVOTransfer - Send EVOware Zip File window*

Specify the message you want to send with the transfer file and specify the eMail address of the recipient. Click **To...** to open the Edit Recipients window. This window is your eMail Address Book and works just like the Edit Recipients window in the Zip & Send tool (see A.9.5.5, A-47).

Note: *The **To...** field is gray (inactive) and shows <FTP> if you have configured an ftp server instead of an eMail address in the Mail Setup window.*

Click to open the Mail Setup window.

This window is used to set up your eMail account and works just like the Mail Setup window in the Zip & Send tool (see A.9.5.3, A-45).
The only differences are:

- You can send the file to an ftp server instead of an eMail address.

- You can encrypt the file before sending it. EVOTransfer on the remote computer will then un-encrypt the file again when the file is received.
- Choose None in the Mail Setup window if you want to create the the transfer file (image file) but do not want to send it by eMail or ftp. You can then transfer the zip file to another PC manually, e.g. using a USB stick or through a network connection. The transfer file is created in the Freedom EVOware installation directory.

The settings you make are stored in the EVOTransfer configuration. You only need the Mail Setup window when you use EVOTransfer for the first time, or if your eMail settings have changed.

The following dialog box is shown if you chose *Manual Selection* in *Send EVOware System*:

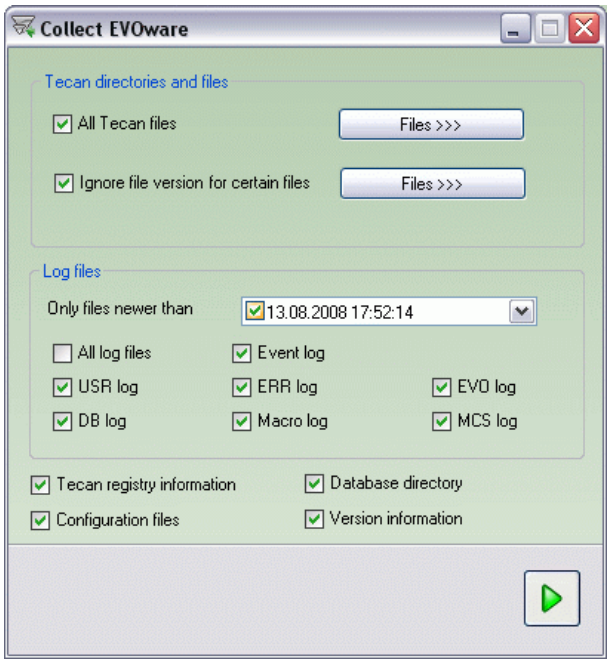


Fig. A-18 *EVOTransfer - Collect EVOware window*

Choose the files you want to send and click the green arrow to continue.

A.9.7.2 Receive EVOware System

The following dialog box is shown if you choose Receive EVOware System in the main window of EVOTransfer:

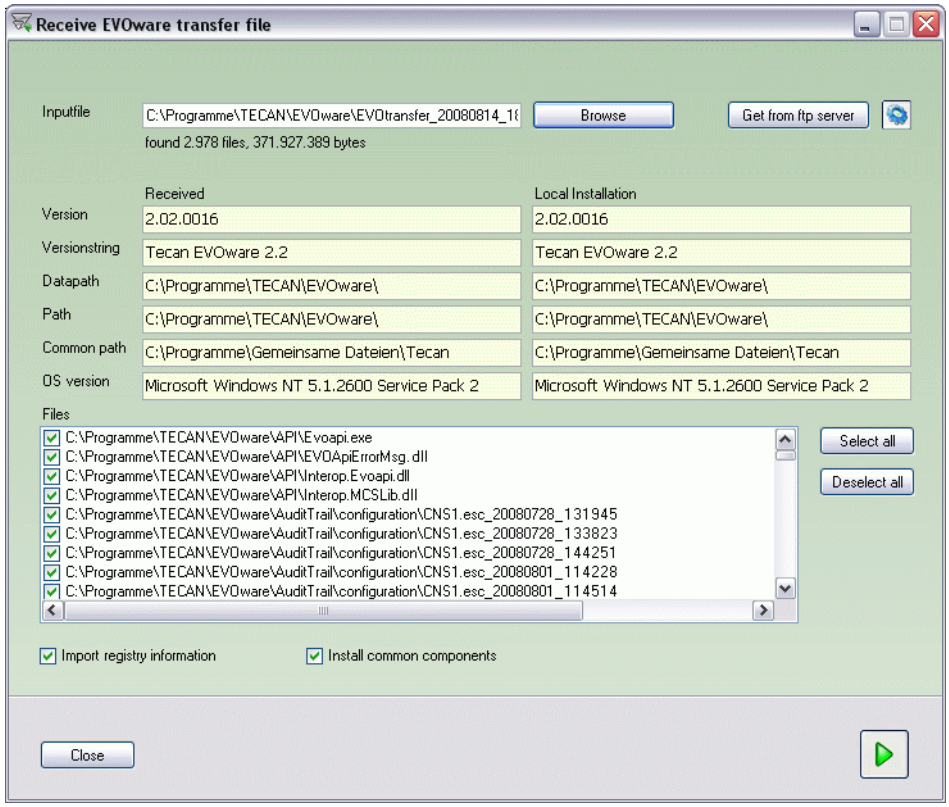


Fig. A-19 *EVOTransfer - Receive EVOware Transfer File window*

The options in this dialog box are as follows:

Click Browse to look for a transfer file from EVOTransfer which is already on your hard disk or a network drive. Alternatively, click Get from ftp server to download the transfer file from an ftp server.

The account information for the ftp server is specified in the Mail Setup window (the blue buttton in the Send Detailed Information window, see A.9.7.1, A-51).

In the *Receive EVOware transfer file* window, the yellow fields at the top right show information on the Freedom EVOware version which is currently installed on your PC and the yellow fields at the top left show information on the Freedom EVOware version contained in the transfer file.

Choose the Freedom EVOware files you want to install and click the green arrow to contuue with the installation.

Note: *If you want to keep a copy of your current EVOware installation, back it up by making a transfer file with EVOTransfer before switching to another EVOware installation. Otherwise, you will not be able to switch back to your current system. Above all, take care to back up your the configuration and data files and your audit trail. You can either do this with EVOTransfer or with the Backup function (see 8.2 "Backing Up and Restoring Your Configuration", 8-3).*

A.9.7.3 Switch EVOware

You can use EVOTransfer to make an image of several different EVOware installations. This allows you to switch between different configuration scenarios or even different EVOware versions for the purpose of demonstration, testing or technical support.

Note: *If you want to keep a copy of your current EVOware installation, back it up by making a transfer file with EVOTransfer before switching to another EVOware installation. Otherwise, you will not be able to switch back to your current system. Above all, take care to back up your the configuration and data files and your audit trail. You can either do this with EVOTransfer or with the Backup function (see* *8.2 "Backing Up and Restoring Your Configuration", 8-3**).*

A.9.8 Gemini Migration Tool

This tool is used to import carrier, labware and liquid class definitions from the Gemini software. It also imports the Gemini worktable, Gemini pipetting scripts and VBScripts.

The imported configuration data replaces all existing Freedom EVOware configuration data, which is no longer available.

To start this tool, navigate to the directory C:\Program Files\Tecan\EVOware using Windows Explorer and double-click on GeminiMigration.exe. Please exit Freedom EVOware first.

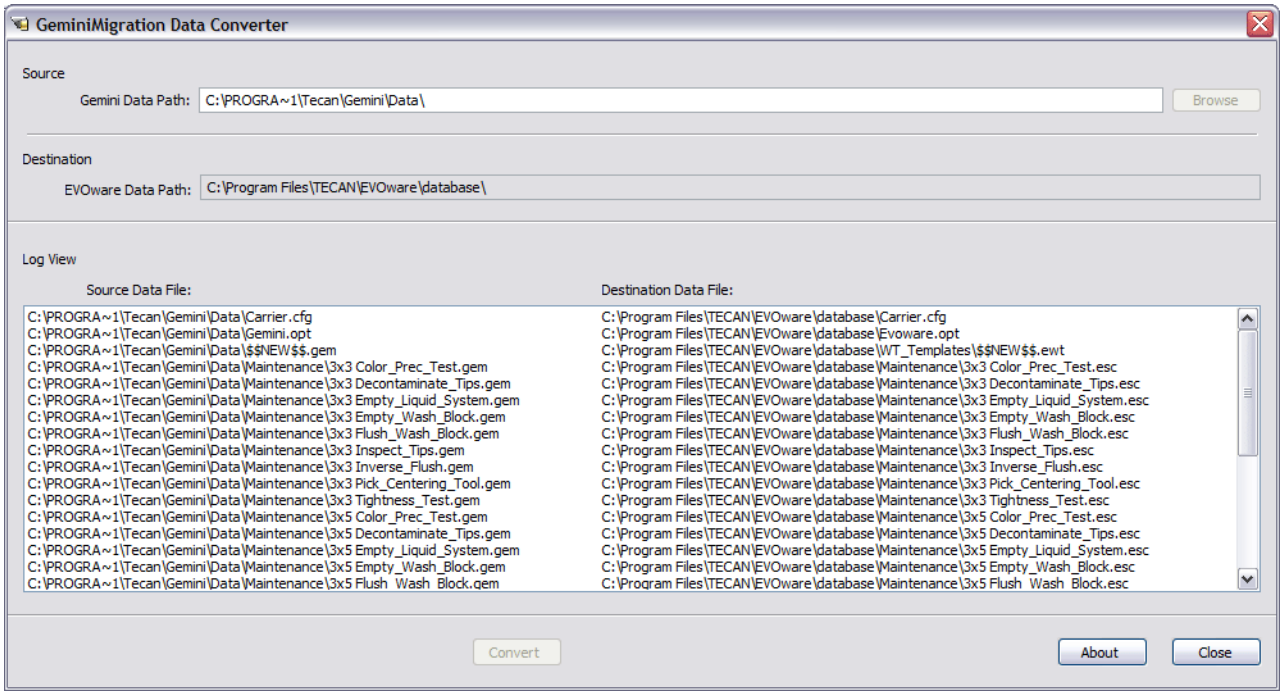


Fig. A-20 *Gemini Migration tool*

Source

Enter the directory containing the Gemini installation or click Browse and choose the directory.

Destination

The Gemini Migration tool determines the directory containing the Freedom EVOware installation automatically.

Log view

This panel reports the Gemini files which were imported into Freedom EVOware and the Freedom EVOware files which were created or replaced.

Note: *Each time changes are made to the configuration files, Freedom EVOware creates backup copies of the original files in the <install_path>/AuditTrail/Configuration directory.*

A.9.8.1 Importing Liquid Classes From Gemini

The Gemini Migration Tool also imports all of the Gemini liquid classes.

In Freedom EVOware, pipetting commands only let you choose liquid classes which are suitable for the current configuration of the pipetting instrument. For example, you will not see liquid classes for DiTis if the LiHa is not currently configured with DiTis.

If you import Gemini scripts which uses DiTis and the LiHa in Freedom EVOware is not configured with DiTis, you will not be able to find the DITI liquid class which was originally intended if you edit the pipetting commands in Freedom EVOware.

This also applies to liquid classes for Active Tips and for the Te-MO. Note: Active Tips are no longer supported by Freedom EVOware.

After importing Gemini scripts with the Gemini Migration Tool, make sure that the pipetting instrument in Freedom EVOware is configured with all of the options that are needed by the scripts. Also see the description of the *Show all liquid classes* checkbox in 10.1 “Liquid Classes Editor”, 10-1.

A.9.9 Shutdown EVOware drivers

To ensure that Freedom EVOware starts quickly, all of the Tecan drivers you have chosen to use are loaded each time the PC is started and remain loaded while the PC is running (see 6.1.11 “Exit, Unload Drivers”, 6-8). This tool is used to unload the Tecan drivers when Freedom EVOware is no longer running. The drivers should be unloaded e.g. if Freedom EVOware reports an internal error. The drivers will be loaded again when you re-start Freedom EVOware.

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools. This tool has no effect if Freedom EVOware is currently running.

A.9.10 IQ Wizard

The IQ (Installation Qualification) Wizard helps you to check that the Tecan software components are correctly installed and guides you through the initial setup of your pipetting instrument in Freedom EVOware.

Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > Tools:

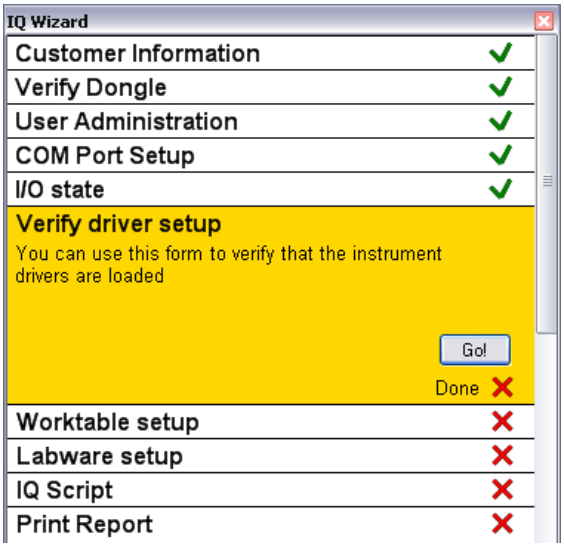


Fig. A-21 *IQ Wizard - Main screen*

The IQ Wizard is sub-divided into 10 steps. Move the mouse over one of the steps to get a short description of the step. Click on a step and click Go if you want to carry out the operation associated with the step.

Some of the steps are provided with a hyperlink to a page in the Freedom EVOware help file. It is normally recommended to proceed through all of the steps in chronological order.

The steps User Administration, COM Port Setup, I/O State, Worktable Setup and Labware Setup can also be carried out directly using Freedom EVOware and/or the Configuration Tool (you do not need to use the IQ wizard for this purpose if you do not want to). However, the IQ Wizard makes it easier and faster to carry out these tasks and is recommended above all to users who are new to Freedom EVOware.

The other steps (Customer Information, Verify Dongle, Verify Driver Setup, IQ Script and Print Report) can only be carried out with the IQ Wizard.

Many of the steps need a Freedom EVOware hardlock (USB dongle) and must be carried out with the pipetting instrument and optional hardware devices connected up and switched on.

A.9.10.1 Customer information

To carry out this step, click on the step and then click Go.

If you have already used the IQ Wizard or the Registration Wizard, you will be prompted to enter your existing user name and password:

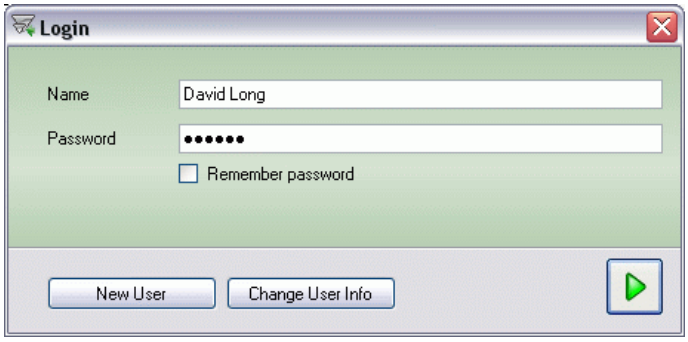


Fig. A-22 *IQ Wizard - Wizard user login*

The user name and password is used to identify the contact information record in the IQ Wizard and the Registration Wizard and is not related to the user name and password which is used to log in to Freedom EVOware.

Click “Change User Info” if you want to edit your user information. Click the green arrow on the right to log in and to proceed to the next step without changing your user information.

If you are using the IQ Wizard for the first time, the wizard will proceed directly to the Contact Information dialog box. You must then enter a new user name and password and some information about your company:

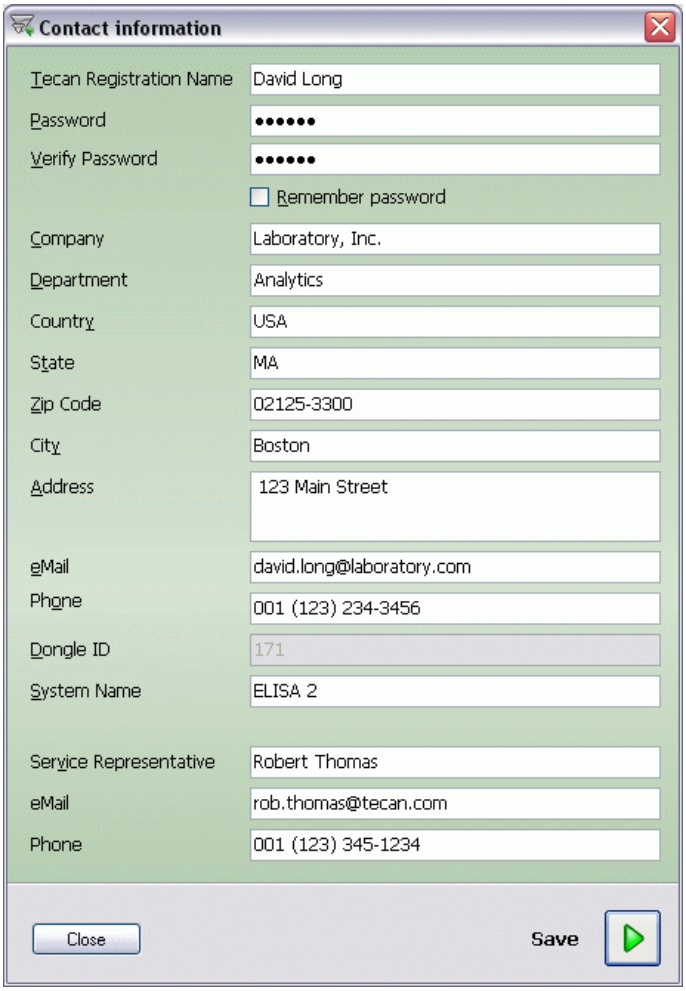


Fig. A-23 *IQ Wizard - Contact information*

The user name and password is used to identify the contact information record in the IQ Wizard and the Registration Wizard and is not related to the user name and password which is used to log in to Freedom EVOware.

The **Dongle ID field** will be filled in automatically after carrying out the Verify Dongle step if the Tecan hardlock (USB dongle) is fitted to your PC.

The **System Name field** makes it easier to identify the Freedom EVOware installation if you have more than one. For example, you can specify the host name of your PC.

The **Service Representative field** and the next two fields are intended for information on the service engineer who is responsible for supporting your Tecan hardware and software components. The information you enter can be viewed in Freedom EVOware by choosing *Service Contact* in the *Help* menu.

Note: *The customer information you enter is also used by the Registration Wizard (see A.9.11, A-63). If you have already entered this information in the Registration Wizard, you do not need to enter it again.*

A.9.10.2 Verify Dongle

This step is used to verify the hardlock (USB dongle) which is fitted to your PC:

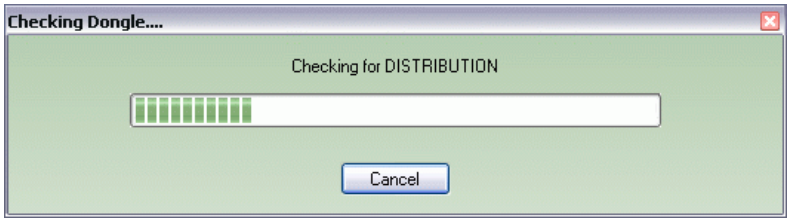


Fig. A-24 *IQ Wizard - Hardlock check*

The following screen shows information on the hardlock type which is fitted:

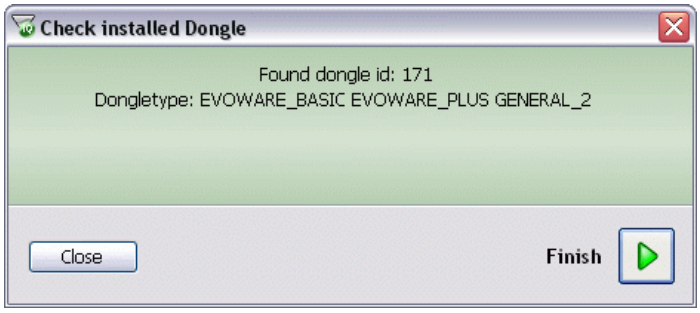


Fig. A-25 *IQ Wizard - Hardlock check finished*

See 3.1.2 “Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus”, 3-2 for more information.

A.9.10.3 User Administration

This step takes you to the Tecan User Management system where you can create additional users for your Freedom EVOware software.

You will be prompted to set up a new account for the Freedom EVOware Administrator or to enter an existing user name and password if the Administrator account has already been created:

Fig. A-26 *IQ Wizard - Login to the user management system*

The user name and password is not related to the name and password which is used to identify the support information record in the IQ Wizard. See 7 “Tecan User Management System”, 7-1 for more information.

Some of the following steps also require you to enter the user name and password of the Freedom EVOware Administrator.

A.9.10.4 COM Port Setup

This step is used to configure the COM ports for hardware devices which are connected to the PC through an RS232 interface. It starts the Freedom EVOware Configuration Tool. See 8.4.3.3 “Com Ports Tab”, 8-36 for more information.

A.9.10.5 I/O State

This step is used to configure the I/O state for communication with the hardware devices. It starts the Freedom EVOware Configuration Tool. See 8.4.3.1 “I/O State Tab”, 8-36 for more information.

A.9.10.6 Verify Driver Setup

This step is used to check the communication with the device drivers and devices and to interrogate driver versions and device firmware versions. The dialog box lists all of the Freedom EVOware drivers which have been installed and have been configured to load. Initially, a question mark “?” is shown alongside all entries.

Click *Ping* to interrogate the driver versions and the device firmware versions:

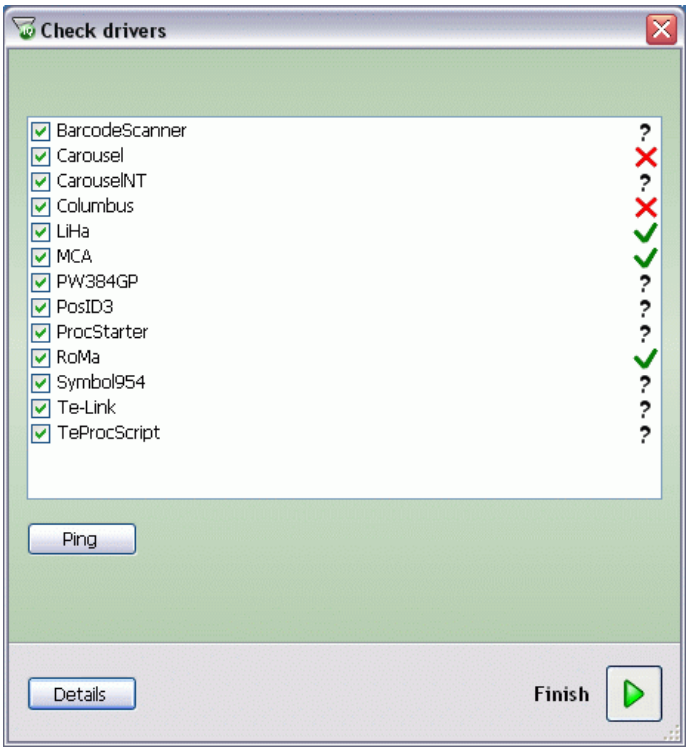


Fig. A-27 *IQ Wizard - Checking the drivers*

A green tick indicates that a response was received from the device, indicating that the drivers are correctly installed and the hardware is correctly connected.

A red cross indicates that a response was not received. Make sure that the devices are correctly connected and switched on. Make sure, too that the I/O state has been switched on. Communication with the device will not be possible if the I/O state is switched off. Click Ping again after resolving the communication problem.

A question mark “?” indicates that the device cannot be checked, for example because a test routine is not currently available for this device.

After carrying out the Ping test, click *Details* to view a report of the test:

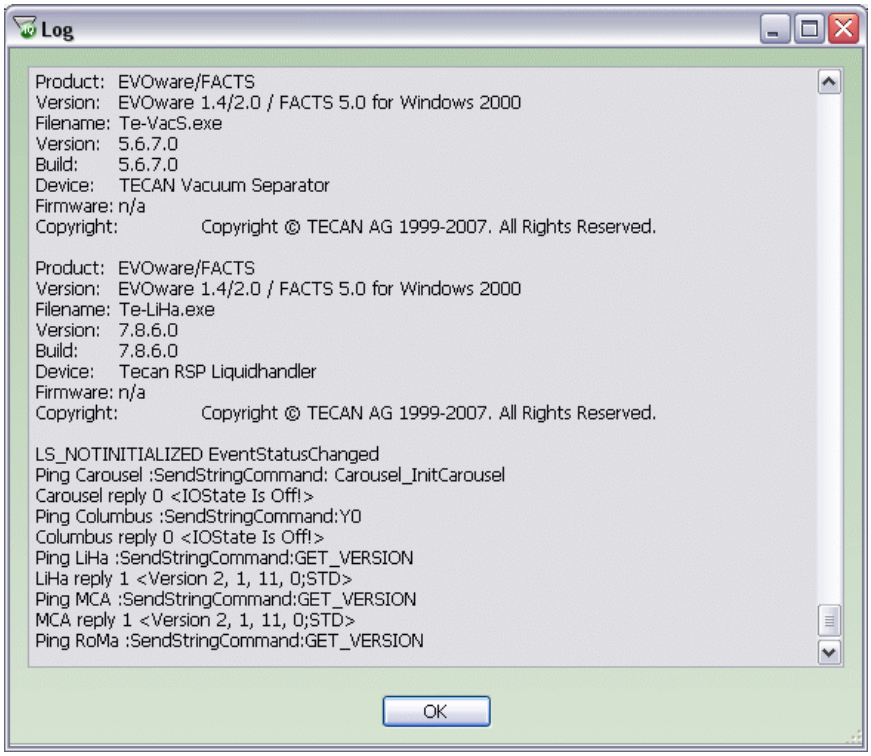


Fig. A-28 *IQ Wizard - Driver report file*

The report includes information on driver versions and device firmware versions.

A.9.10.7 Worktable Setup

This step is used to configure the worktable with the carriers which are needed by your application. It starts Freedom EVOware to allow you to use the Worktable Editor. See 11.3.1 “Setting Up Carriers on the Worktable”, 11-2 for more information.

After setting up the worktable, to return to the IQ Wizard you must save the worktable layout as the worktable template Empty (template file Empty.ewt). To do this, click in the Worktable Editor and click *Save worktable as template*. After returning to the IQ Wizard, it will list all of the carriers you have chosen to use:

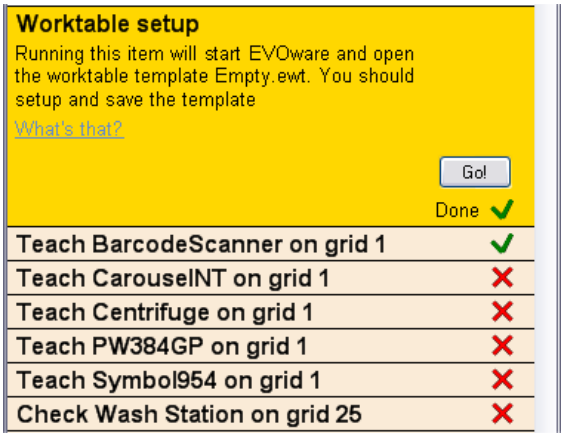

Worktable setup
Running this item will start EVOware and open the worktable template Empty.ewt. You should setup and save the template
What's that?
Go!
Done
Teach BarcodeScanner on grid 1
Teach CarouselNT on grid 1
Teach Centrifuge on grid 1
Teach PW384GP on grid 1
Teach Symbol954 on grid 1
Check Wash Station on grid 25

Fig. A-29 *Registration Wizard - Collecting information*

The next step is to configure all of the carriers you have chosen.

In the list, carriers which can be accessed by the LiHa are labelled Check ... Carriers which can only be accessed by the RoMa are labelled Teach ...

For each of the carriers in turn, click on the entry and click Go. This opens the Edit Carrier dialog box in Freedom EVOware (see 9.5 “Configuring Carriers”, 9-39). Check that the dimensions in the dialog box match the dimensions of your carriers and check and/or teach the RoMa vectors that you need (see 9.6 “Creating and Editing Plate Robot Vectors”, 9-55).

A.9.10.8 Labware Setup

This step is used to configure the worktable with the labware which is needed by your application. It starts Freedom EVOware to allow you to use the Worktable Editor. See 11.4.1 “Choosing Labware for a Pipetting Script”, 11-4 for more information.

After setting up the worktable, to return to the IQ Wizard you must save the results as a pipetting script (which does not yet contain any script commands). To do this, chose Save in the File menu. After returning to the IQ Wizard, it will list all of the labware items you have chosen to use:

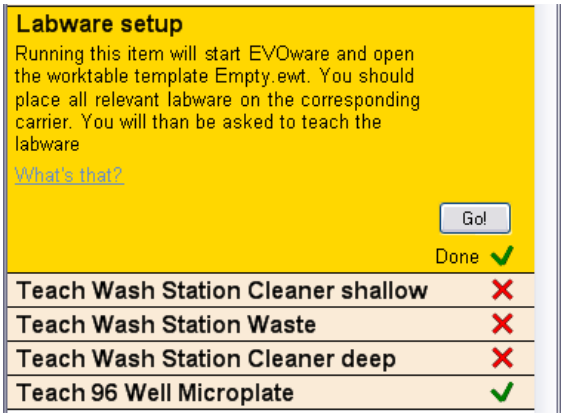

Labware setup
Running this item will start EVOware and open the worktable template Empty.ewt. You should place all relevant labware on the corresponding carrier. You will than be asked to teach the labware
What's that?
Go!
Done
Teach Wash Station Cleaner shallow
Teach Wash Station Waste
Teach Wash Station Cleaner deep
Teach 96 Well Microplate

Fig. A-30 *Registration Wizard - Collecting information*

The next step is to configure all of the labware you have chosen.

For each of the labware items in turn, click on the entry and click Go. This opens the Edit Labware dialog box in Freedom EVOware (see 9.4 “Configuring Labware”, 9-15). Check that the dimensions in the dialog box match the dimensions of your labware and check and/or teach the labware coordinates using the LiHa (see 9.4.4 “Teaching the Labware Coordinates”, 9-26). If you want to use the tube robot (PnP), check and/or teach the PnP vectors that you need (see 9.7 “Creating and Editing Tube Robot Vectors”, 9-63).

A.9.10.9 IQ Script

This step creates a simple pipetting script for Freedom EVOware which includes commands for all of the devices which you have set up. The script allows you to check that all of the devices are functioning correctly. Please refer to the comment lines in the script for additional information on how to use the script.

A.9.10.10 Print IQ Report

This step prints a report of all of the configuration steps which have been completed. You can use the report for documenting the work you have carried out.

A.9.11 Registration Wizard

The Registration Wizard is intended to simplify the update of hardware and software and the support of your Tecan products.

It collects information on the computer where the Tecan product is installed and the versions and/or serial numbers of the installed Tecan software and hardware components. This information, which is useful to Tecan support technicians, is sent to Tecan using one of three methods (directly online, eMail or file).

The personal and company data which is entered in the Registration Wizard is used by Tecan to identify the appropriate contact person at your company if a support issue requires clarification.

The data is encrypted before sending and stored securely on a server operated by Tecan in Switzerland. All data will be deleted automatically after a duration of at most 20 years. You can request the correction or premature deletion of this data by contacting Tecan at registration@tecan.com. The data is not used for marketing purposes and will not be handed over to third parties.

Click on the link *What information will be transferred?* in the Select Registration Method dialog box (Fig. A-37, A-67) to view details of the information which will be sent.

The registration process is not a substitute for the Tecan hardlock (dongle).

A blinking message will be shown in the Freedom EVOware status bar if your software is not yet registered or if you have made some changes to the installed software components:

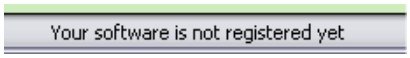


Fig. A-31 *Message in the Freedom EVOware status bar*

Double-click on the message to start the Registration Wizard.

You should use the Registration Wizard in the following situations:

- Freedom EVOware has just been installed and Tecan has not yet received any details of your installation, or

- You have made some changes to your Freedom EVOware installation, such as installing new drivers or updating existing drivers.

Note: *You can only complete the registration process if the Tecan hardlock (USB dongle) is fitted to your PC.*

Note: *Provided that the hardlock is fitted, all of the purchased functions of Freedom EVOware can be used, even if the software is not registered.*

The following dialog box is shown at the start of the registration process:

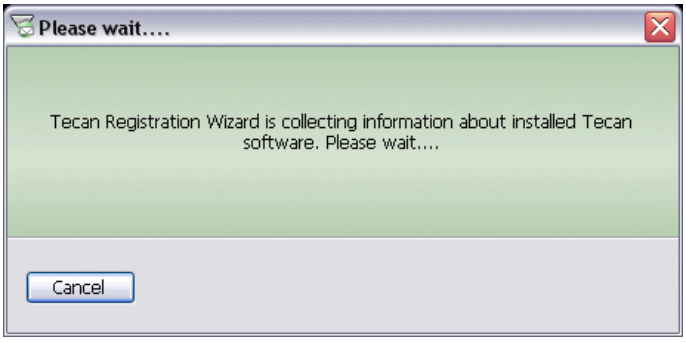


Fig. A-32 *Registration Wizard - Collecting information*

Click *Cancel* if you want to start using Freedom EVOware without delay and you do not want to register at this stage.
Unless you click Cancel, the Registration Wizard will then check the type and serial number of your hardlock:

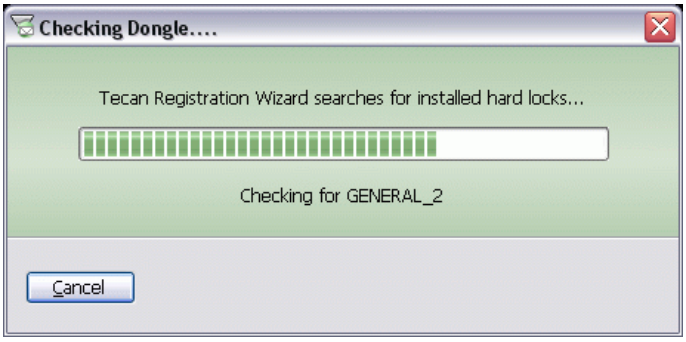


Fig. A-33 *Registration Wizard - Checking the hardlock*

The following dialog box is shown when checking is finished:

Fig. A-34 *Registration Wizard - Register*

Click Register to proceed with the registration (see later for information on how to obtain and enter the registration code).

If you have already used the IQ Wizard or the Registration Wizard, you will be prompted to enter your existing user name and password:

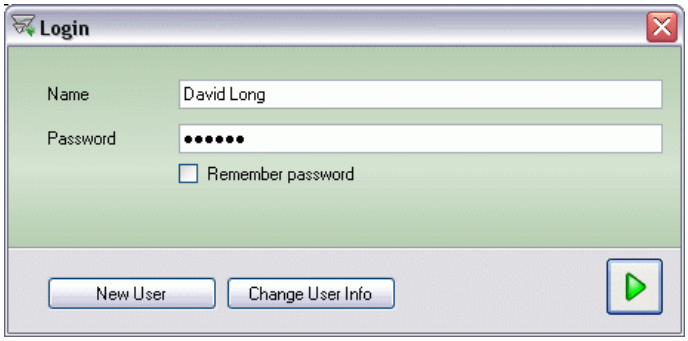


Fig. A-35 *Registration Wizard - Wizard user login*

The user name and password is used to identify the contact information record in the Registration Wizard and the IQ Wizard and is not related to the user name and password which is used to log in to Freedom EVOware.

Click “Change User Info” if you want to edit your user information. Click the green arrow on the right to log in and to proceed to the next step without changing your user information.

If you are using the Registration Wizard for the first time, the wizard will proceed directly to the Contact Information dialog box. You must then enter a new user name and password and some information about your company:

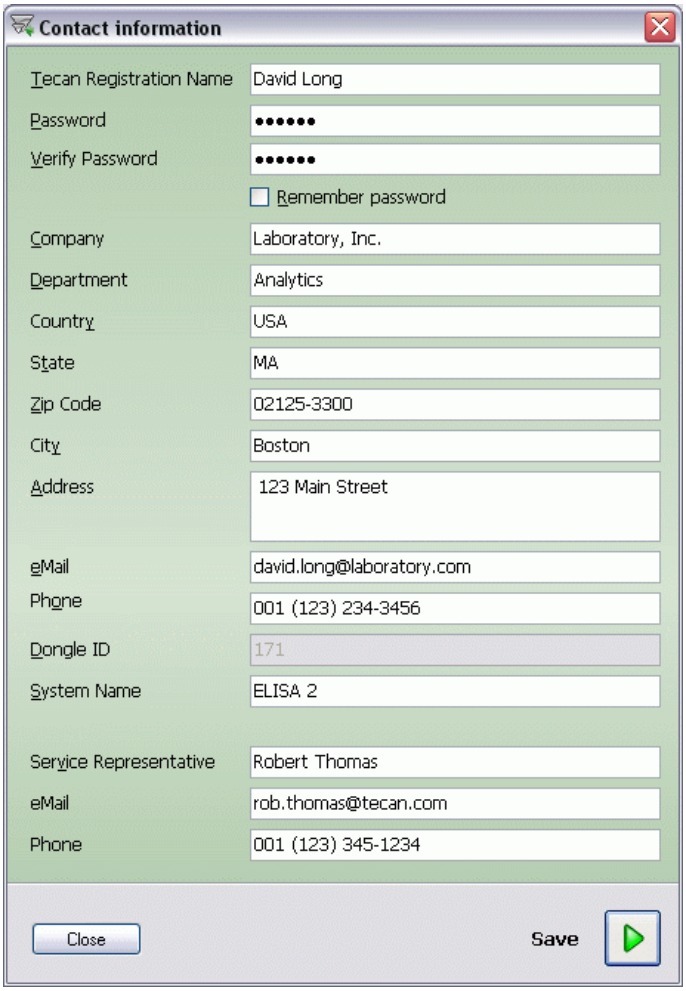


Fig. A-36 *Registration Wizard - Customer information*

The user name and password is used to identify the contact information record in the Registration Wizard and the IQ Wizard and is not related to the user name and password which is used to log in to Freedom EVOware.

The **Dongle ID field** will be filled in automatically if the Tecan hardlock (USB dongle) is fitted to your PC.

The **System Name field** makes it easier to identify the Freedom EVOware installation if you have more than one. For example, you can specify the host name of your PC.

The **Service Representative field** and the next two fields are intended for information on the service engineer who is responsible for supporting your Tecan hardware and software components. The information you enter can be viewed in Freedom EVOware by choosing *Service Contact* in the *Help* menu.

Note: *The customer information you enter is also used by the IQ Wizard (see A.9.10, A-55). If you have already entered this information in the IQ Wizard before you use the Registration Wizard, you do not need to enter it again.*

You will then be asked about the method you want to use to send the support information to Tecan:

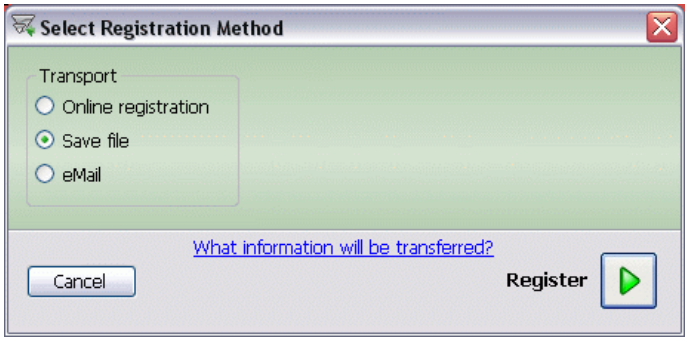


Fig. A-37 *Registration Wizard - Registration Method*

The available methods are as follows:

- Choose **Online registration** if your PC has a direct connection to the Internet.
- Choose **Save file** if you want to save the information in a file and send it to Tecan manually using a standard eMail client such as Microsoft Outlook which is installed on this PC or on another PC.
- Choose **eMail** if your PC is conected to the Internet and a standard eMail client such as Microsoft Outlook is installed.
- You must send the registration file to registration@tecan.com.

The following information will be sent to Tecan:

- Information on the computer where the Tecan product is installed and the versions and/or serial numbers of the installed Tecan software and hardware components.
- Your name, company name, address and telephone number.

The information is encrypted before sending. Click on the link *What information will be transferred?* to view details of the information which will be sent.

The following dialog box is shown if you choose *eMail* under *Registration Method*:

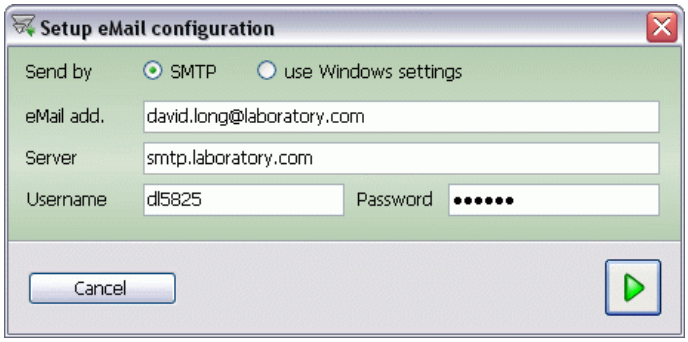


Fig. A-38 *Registration Wizard - eMail setup*

SMTP, Use Windows Settings

Click the radio buttons to choose whether to send the registration information via SMTP or using the Windows settings for an existing eMail client such as Microsoft Outlook.

SMTP

Email address

Specify your eMail address. The registration information from Tecan will be sent to this address.

Server

Specify the address of the SMTP server you want to use for sending the registration information. You should normally specify the SMTP server address which is recommended by your eMail provider or eMail administrator.

User

Specify the user name for SMTP authentication.

Password

Specify the password for SMTP authentication.

The user name and password for SMTP authentication depends on the SMTP server. In most cases, it is the same user name and password which is used to collect eMails using the POP3 protocol. With some eMail providers, the user name is the same as the eMail address.

Use Windows Settings

If you choose this option, the Registration Wizard will use the default eMail sending method and/or local eMail client which is configured with Internet Options in the Windows Control Panel.

A.9.11.1 Finishing the registration

If you send the registration information online (you chose *Online registration* in the Registration method dialog box - see Fig. A-37, A-67), the registration code is normally sent to your PC within a few minutes. The registration process will then be completed automatically - no further user actions are required.

If you send the registration information by eMail (you chose *Save file* or *eMail* in the Registration method dialog box), after processing the details Tecan will send a software registration code to your eMail address.

After you have received the registration code by eMail, start the Registration Wizard again by clicking on the registration message in the status bar of Freedom EVOware. Then step through the wizard until you reach the *Register* dialog box. Then click *Enter code* and enter the code. The software is now registered.

In either case (online registration or eMail), creating the registration code takes place at Tecan using an automatic process.

A.9.12 Import vCards Tool

This tool is used to import user information into the Tecan User Management System (user database) from vCard files. This saves you having to type the data in manually.

vCard files (file extension .vcf) can be created with the Windows Address Book function or with popular eMail programs such as Microsoft Access and can be automatically attached to eMails which you receive and send.

This tool lets you import additional information into an existing Tecan user account entry or create a new user account based on the information in the vCard file.

See 7 “Tecan User Management System”, 7-1 for more information on the user management system. Users, groups and password rules are configured in Freedom EVOware’s Configuration Tool (see 8.3.3 “User Management Section”, 8-16).

Start this tool with the shortcut in Start > All Programs > Tecan > Tecan User Management > Import vCards.

Enter your user name and password and click OK. You can only use the Import vCards Tool if you have been given Freedom EVOware Application Specialist or Administrator access rights.

When it is first started, the tool lists all of the existing users in the Tecan User Management System:

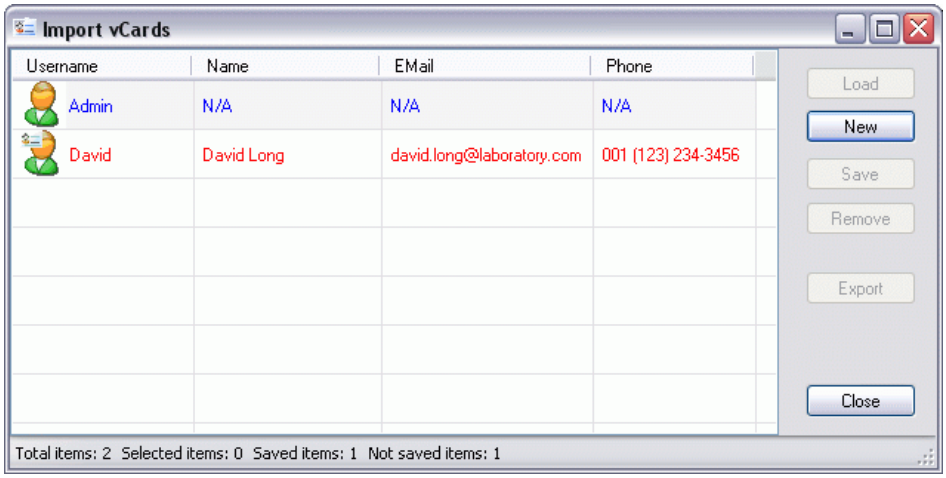


Fig. A-39 *Import vCards Tool*

The red colour shows that an entry has been modified and not yet saved or a new entry has been added and not yet saved. Unchanged entries are shown in blue.

The buttons in this dialog box are as follows:

Load

Click this button to open a vCard file and append the information it contains to the currently selected entry. This button is only active if you have selected an existing account entry. You can also append information by dragging the VCard onto the user account entry using Windows Explorer.

New

Click this button to open a vCard file and create a new user account based on the information it contains. When you save the entry (by clicking Save) you will be prompted to enter a user name and password. User names must not contain spaces - the Import vCards tool replaces each space by an underscore character automatically. This button is not active if you have selected an existing account entry.

Save

Click this button to save the changes you have made to the currently selected entry. This updates the user database.

Remove

Click this button to undo the changes you have made to the currently selected entry. If you have created a new user account from the vCard file and the entry has already been saved, it will not remove the user account completely. This must be done in the user management system.

Export

Click this button to export the information in the currently selected entry as a vCard file.

Close

Click this button to close the tool.

A.9.13 Version Checker Tool

This tool is used to check the versions of the installed device drivers, other software components such as DLL files and device firmware. It is mainly intended for Tecan Field Service Engineers.

The version information which is collected from the files and/or retrieved from the devices (by sending firmware commands) is compared against a list of expected versions which is stored in several text files in csv format. These files also specify which of the software components and/or devices should be checked.

To check device firmware versions, the devices and the pipetting instrument must be connected to the PC and switched on.

Start this tool with the shortcut in Start > All Programs > Tecan > Version Checker > Version Checker.

The results of the version checking is shown as a collapsible tree structure. Entries with non-expected versions are shown in red. Entries with the correct version are shown in green:

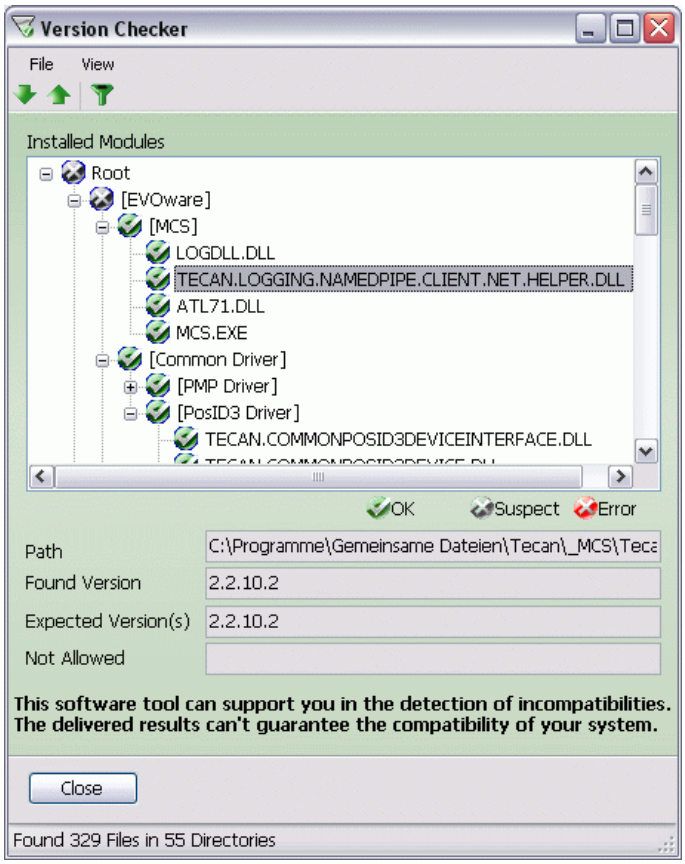


Fig. A-40 *Version Checker tool*

The menus in this tool are as follows:

File menu

Save result: Saves a list of non-expected versions in a text file.

Print result: Prints a list of non-expected versions.

View menu

Collapse all/Expand all: Collapse or expand the tree structure.

Show Errors / Warnings only: Only show entries with errors or warnings. You can also toggle this function by clicking the green button below the View menu.

Next error / Previous error: Skip to the next or previous error. You can also skip to the next or previous error by clicking the green arrows below the File menu.

The Version Checker tool does not report on software components which are missing, even if they are non-optional and thus necessary for the correct functioning of Freedom EVOware or one of its features.

A.10 LogViewer Tool

The Tecan Logging Server is a central software module which handles the logging of system and error messages for all Tecan software components. The LogViewer tool is used to view, filter and search for messages which have been received by the Tecan Logging Server.

To start LogViewer choose Start > All Programs > Tecan > Logging > V2.1 > LogViewer. The Tecan Logging Server is normally configured to start automatically when the PC is started.

The LogViewer has three main windows:

- The Channels window (normally on the left side).
- The Message List window (normally on the right side).
- The Message Detail window (normally below the other windows). The Message Detail window shows full details of the message which is currently selected in the Message List window.

The windows can be docked and undocked and their positions can be configured by the user (see A.10.4 “Configuring the user interface”, A-74). Use the View menu to show or hide the Message Detail and Channels windows as required (see A.10.5.2 “View Menu”, A-75).

The Tecan Logging Server stores log files in xml format in the directory Documents and Settings > All Users > Application Data > Tecan > LoggingServer> LogFiles. A new log file is automatically created when the log file size exceeds 10 MB.

The log file currently in use is named Current <date> <time>.xml, where <date> and <time> are the creation date and time of the file. Files no longer in use are named Logfile <date> <time>.xml. The log files are protected against unauthorized manipulation and contain a checksum.

A.10.1 Using the Channels window

The Channels window is used to pre-select or filter messages of a particular type. For example, the Drivers channel refers to messages from hardware device drivers such as the RoMa driver.

If you check the Drivers checkbox in the Channels window and uncheck all other checkboxes, the Message List window will only show messages which have come from device drivers.

The channels have a hierarchical (tree) structure and some of the channels contain sub-channels. For example, in log files from Freedom EVOware, the Drivers channel normally has a RoMa sub-channel:

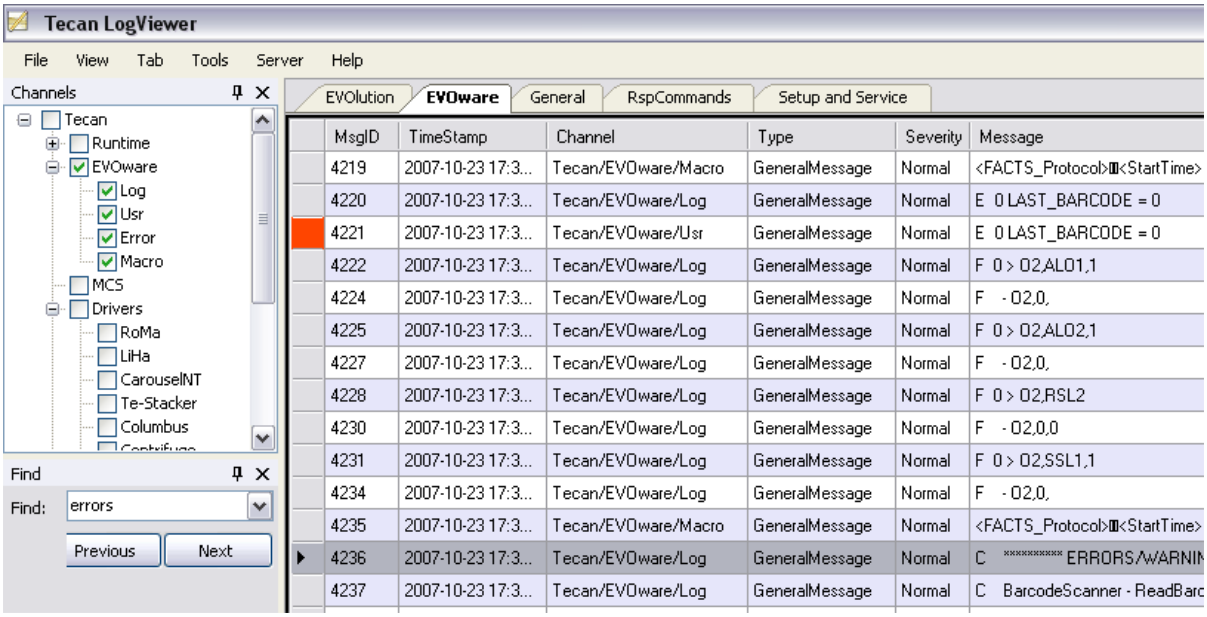

Tecan LogViewer
File View Tab Tools Server Help
Channels
Tecan
Runtime
EVOware
Log
Usr
Error
Macro
MCS
Drivers
RoMa
LiHa
CarouselNT
Te-Stacker
Columbus
Find
Find: errors
Previous
Next
EVOlution
EVOware
General
RspCommands
Setup and Service
MsgID TimeStamp Channel Type Severity Message
4219 2007-10-23 17:3... Tecan/EVOware/Macro GeneralMessage Normal <FACTS_Protocol><StartTime>
4220 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal E 0 LAST_BARCODE = 0
4221 2007-10-23 17:3... Tecan/EVOware/Usr GeneralMessage Normal E 0 LAST_BARCODE = 0
4222 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal F 0 > 02,AL01,1
4224 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal F - 02,0,
4225 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal F 0 > 02,AL02,1
4227 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal F - 02,0,
4228 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal F 0 > 02,RSL2
4230 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal F - 02,0,0
4231 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal F 0 > 02,SSL1,1
4234 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal F - 02,0,
4235 2007-10-23 17:3... Tecan/EVOware/Macro GeneralMessage Normal <FACTS_Protocol><StartTime>
4236 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal C ********** ERRORS/WARNI
4237 2007-10-23 17:3... Tecan/EVOware/Log GeneralMessage Normal C BarcodeScanner - ReadBarc

Fig. A-41 *LogViewer, showing the Find window and a bookmark (Message Details window not shown)*

The tree structure of the Channels window is automatically adjusted to match the contents of the currently open log file. Some of the sub-channels may be missing if the log file does not contain any messages for these sub-channels.

You can expand the Drivers channel to view the sub-channels it contains by clicking on the '+' box on the left side. Click the '-' box if you want to collapse the Drivers channel again.

If you expand the Drivers channel, check the RoMa checkbox and uncheck all other checkboxes in the Channels window, the Message List window will only show messages which have come from the RoMa device driver (if there are any to show) and not from the other device drivers.

When investigating a particular event or problem, it can be helpful to select only those channels (message types) which are directly relevant and to uncheck the checkboxes of all other channels.

You can also select channels as follows:

Left click on a check box

Selects / deselects only this channel.

Right click on the label (name) of a check box

Opens a drop down list which allows you to choose between select all and deselect all.

Right click on a check box

Selects / deselects this channel and all of its subchannels.

When the LogViewer has just been installed, the channel selections of the five tabs in the Message List window (EVOlution, EVOware, General, RspCommands and Setup & Service) are pre-configured to filter and display only those messages which are relevant for that tab. The channel selection can be adjusted by the user and is automatically saved in a user profile which is associated with the MS Windows user name. When you start the LogViewer again later, the last used channel selection is automatically re-activated. A separate channel selection is saved for each user for each of the five tabs. See also A.10.2 "Using the Message List window", A-74.

A.10.2 Using the Message List window

The Message List window shows messages which are contained in the currently open log file(s). Warning messages are shown in blue and error messages are shown in red. Other messages are shown in black (default text colour). Note that the red colour appears slightly darker if the message line has a blue background.

Messages from Tecan software components and hardware devices have several different structures which depend on the type of message. For example, messages sent by the Tecan Communication Server can be acknowledged using a response code. Other types of message do not have response codes and do not need a Response column.

The tabs at the top of the Message List window are used to adjust the view (e.g. column headings) of the message list to be suitable for a particular message structure, message type or message source. For example, the RspCommands tab is the appropriate tab to choose if you want to view messages from the Tecan Communication Server.

See A.10.5.3 “Tab Menu”, A-76 for information on the intended usage of the other tabs.

When you choose a particular tab, you are also choosing a configurable selection of channels in the Channels window. See also A.10.1 “Using the Channels window”, A-72.

The message ID shown in the MsgID column is unique across all tabs. Depending on your channel selection, the same message may appear in several tabs but with a different view and different column headings.

A.10.3 Using the Message Detail window

The Message Detail window shows full details of the message which is currently selected in the Message List window.

Messages from Tecan software components and hardware devices have several different structures which depend on the type of message. The tabs at the bottom of the Message Detail window are used to adjust the formatting (layout) of the detailed view of the message. It is generally appropriate (but not obligatory) to choose the same tab that you choose in the Message List window. The same tab is chosen by default, but you can choose another tab if required.

A.10.4 Configuring the user interface

Most of the windows in the LogViewer tool have the following two icons on the right side of the title bar:

Close

Click the “X” icon to close the window.

Autohide

Click this icon to switch the window to autohide mode. In autohide mode, the window will automatically collapse to a tab at the edge of the main window when you click in another window (after a short delay).

Move the mouse over the tab to expand the window again. Click on the Autohide icon again to switch back to normal mode.

When working with several windows, Autohide mode hides currently unused windows to make more space on the screen.

Docking and undocking the windows

To change the position of one of the windows, click on the title bar of the window and drag it to another part of the screen. Docking anchors are shown as soon as you start to drag. Drag and drop the window onto a docking anchor to dock the window at the chosen position. If you do not drop the window onto a docking anchor, the new window position will be undocked (floating). Double click on the window title to switch between docked and undocked mode.

A.10.5 LogViewer Menus

A.10.5.1 File menu

Open

This menu item is used to open a log file in xml format. When the LogViewer is first started, it automatically opens the most recent log file (the log file which is currently being used to record messages). New messages which arrive from Tecan software components and drivers are appended to the end of the log file and the Message List window is continuously updated (Online mode). Choose File > Open to open an older (historical) log file. The LogViewer then switches to Offline mode, and recently received messages are no longer shown.

In Offline mode, you can sort the messages in the Message List window by clicking on the column headers. In Online mode, the messages are always sorted chronologically.

When you choose File > Open, use the Shift and Ctrl buttons on the keyboard if you want to select several log files in the file browser window and open them simultaneously. Alternatively, select the files you want to open in Windows Explorer and drag them onto the LogViewer window.

Note: *Alternatively, clear the Message List window with Shift+Del, select one or more log files in Windows Explorer and drag them onto the Message List window.*

The total number of messages and the filtered number of messages in the currently open log file(s) is shown at the bottom of the main window (see also A.10.5 “LogViewer Menus”, A-75, Filter).

To switch back to online mode, choose Online in the View menu or click the light green Offline tab at the bottom right of the main window. Then press F5 to refresh the view.

Exit

This menu item is used to exit the Log Viewer.

Note: *The Logging Server continues to log Tecan messages independently of the chosen mode in the LogViewer tool (Online mode, Offline mode or currently not running).*

A.10.5.2 View Menu

Channels

This menu item is used to show or hide the Channels window.

Message Detail

This menu item is used to show or hide the Message Details window.

Note: *Press F5 if you need to refresh the view of the Message List window.*

Clear (Shift + Del)

This menu item is used to clear all of the messages in the Message List window.

A.10.5.3 Tab Menu

Online / Offline

These menu items are used to switch between Online and Offline mode.

Follow Tail

Activate this option if you want the Message List window to scroll automatically in Online mode so that the latest messages are always visible at the bottom of the screen. If you want to study a specific message while the Tecan software is still running (i.e. messages are still arriving), you can switch off Follow Trail mode to prevent the message from scrolling off the top of the screen.

EVOlution

This menu item switches to the EVOlution tab of the Message List window. This tab is intended for viewing messages from the Freedom EVOlution software package.The initial default channel selection for this tab is Tecan/Runtime, Tecan/MCS and Tecan/Drivers.

EVOware

This menu item switches to the EVOware tab of the Message List window. This tab is intended for viewing messages from the Freedom EVOware software package. The initial default channel selection for this tab is Tecan/EVOware. See also A.10.6 “LogViewer Channel assignments for Freedom EVOware”, A-79.

General

This menu item switches to the General tab of the Message List window. This tab shows all mandatory fields (the fields which are mandatory for all message types).

RspCommands

This menu item switches to the RspCommands tab of the Message List window. This tab is intended for viewing messages from the Tecan Communication Server. The initial default channel selection for this tab is Tecan/Communication.

Setup and Service

This menu item switches to the RspCommands tab of the Message List window. This tab is intended for messages from the Instrument Software package, which contains the Setup & Service software. The initial default channel selection for this tab is Tecan/Setup and Service.

A.10.5.4 Tools Menu

Find

This option is used to search for a particular string in the messages. Click Next or Previous to jump to the next or previous message which contains the string. If the string is found, it is shown highlighted in yellow in the Message Detail window.

Filter

This option is used to filter the messages which are shown in the Message List window according to several different criteria. For example, you can choose to show only those messages which have a specified string in the channel name or the message text or have a specified range of message IDs. Filtering by channel name has a similar effect to de-selecting channels in the Channels window.

After specifying a new filter, check the checkbox to activate it and click Apply to apply the filter to the Message List window. Click Clear to clear the filter again.

You can specify several filters and activate the one you want to use. If you activate more than one filter simultaneously, the filter settings are combined using the AND function. The filter settings are automatically saved in a user profile which is associated with your MS Windows user name.

Bookmarks

To use the Bookmarks option, right click on a message in the Message List window and choose Add from the context menu. Alternatively, click in the margin column, to the left of the MsgID column. The margin column is then marked red, so you can easily find the message again later. In addition, the message is added to the Bookmarks window. To go to the same message again later, select the bookmark in the Bookmarks window and click *Jump To*.

If the same message (the same message ID) is also present in another tab of the Message List window, it will be bookmarked there too (the margin column will be marked in red). To go to a bookmarked message in another tab, switch to the other tab, select the bookmark in the Bookmarks window and click *Jump To.* If the bookmarked message is not present in the other tab, the next closest message (closest message ID) will be highlighted instead.

To remove the bookmark again, select the message in the Bookmarks window and click Remove. Alternatively, right click on the bookmarked message in the Message List window and choose *Remove* from the context menu.

Highlighting

To use the Highlighting option, click Add, check the checkbox and enter the string you want to highlight in the coloured field. Use the pull-down list to choose the colour you want to use for this string. When you scroll through the messages in the Message List window, if the specified string is found it will be highlighted in color in the Message Detail window.

Click Add again to specify another string that you want to highlight. It is normally helpful but not obligatory to choose a different highlighting colour for each string you want to highlight.

A.10.5.5 Server Menu

Options

This menu item shows the directory which the Logging Server uses to store the log files. Click the right arrow button to jump to the configured log files directory in Windows Explorer. This menu item also shows whether the Tecan Logging Server is installed on your PC and is currently running.

Create Bookmark File

This menu item creates an empty text file in the log files directory which acts as a bookmark (visible separator) when viewing the contents of the directory in Windows Explorer. This helps you to identify the right files if you want to drag a group of log files to another directory for archiving or to the Message List window of the LogViewer tool for analysis:

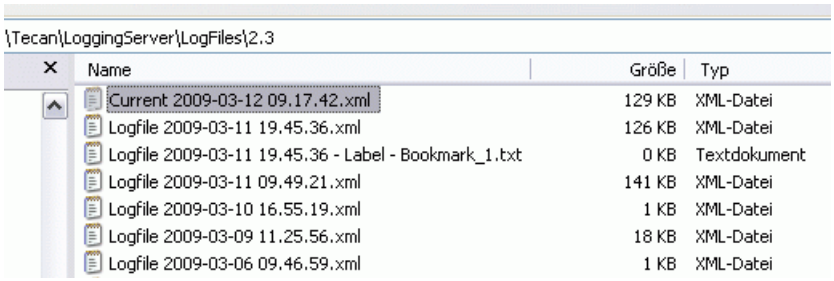

\Tecan\LoggingServer\LogFiles\2.3
Name
Größe
Typ
Current 2009-03-12 09.17.42.xml 129 KB XML-Datei
Logfile 2009-03-11 19.45.36.xml 126 KB XML-Datei
Logfile 2009-03-11 19.45.36 - Label - Bookmark_1.txt 0 KB Textdokument
Logfile 2009-03-11 09.49.21.xml 141 KB XML-Datei
Logfile 2009-03-10 16.55.19.xml 1 KB XML-Datei
Logfile 2009-03-09 11.25.56.xml 18 KB XML-Datei
Logfile 2009-03-06 09.46.59.xml 1 KB XML-Datei

Fig. A-42 *Log files and a bookmark file in Windows Explorer*

If you plan to analyse the log files it can be helpful to create a bookmark file before you start a new pipetting run.

To create a bookmark file, select Create Bookmark File in the Server menu. Specify a label for the bookmark file in the Create Bookmark dialog box and click Create:

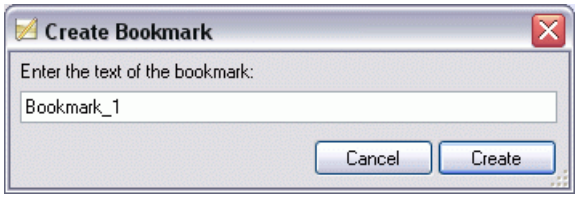


Fig. A-43 *Create Bookmark dialog box*

This closes the currently open log file, creates the bookmark file and starts a new log file.

The filename of the bookmark file which is created is Logfile <date> <time> Label - <mylabel>.txt, where <mylabel> is the label you specify in the above dialog box.

A.10.5.6 Help Menu

About Tecan LogViewer

This menu item shows information on the LogViewer version which is installed and Tecan copyright information.

A.10.6 LogViewer Channel assignments for Freedom EVOware

When you are investigating a pipetting script or process which you have run under Freedom EVOware, the following logging channels in the LogViewer tool are of particular interest:

Tecan/EVOware/Log

This channel contains all message types in Tab. A-1 “Structure of the log files”, 🗎 A-8 (including firmware commands sent to the pipetting instrument) and information on user logins.

Tecan/EVOware/Usr

This channel contains message types D and E in Tab. A-1 “Structure of the log files”, 🗎 A-8 and information on user logins. To activate logging information for this channel, see 8.3.1.4 “Protocol Options Tab”, 🗎 8-8, Log Options panel.

Tecan/EVOware/Error

This channel contains message types C to E in Tab. A-1 “Structure of the log files”, 🗎 A-8 and information on user logins. To activate logging information for this channel, see 8.3.1.4 “Protocol Options Tab”, 🗎 8-8, Log Options panel.

Tecan/EVOware/Macro

This channel contains messages from internal Freedom EVOware commands (macros). This includes messages from the scheduler, the kernel and device drivers.

Tecan/Drivers (including sub-channels)

The sub-channels of the Drivers channel contain messages which are related to hardware devices. The sub-channels are named according to the device call name in Freedom EVOware. If required, e.g. for testing purposes, you can configure Freedom EVOware to output more detailed logging information which includes device firmware commands (see 8.4.3.2 “Logging Option”, 🗎 8-36). Messages to and from device drivers are also contained in the Tecan/EVOware/Macro channel.

Tecan/MCS

This channel contains messages from the Message Control Server (MCS) in Freedom EVOware. The MCS does not normally output logging information. To activate logging for the MCS, see A.1.6 “Log Files of Type MCS”, 🗎 A-10.

Tecan/Database

This channel contains messages from Freedom EVOware’s internal database.

Tecan/EVOware/Addons

The sub-channels of this channel are used for messages from software add-ons for Freedom EVOware such as Sample Oriented EVOware.

A.11 Tecan Driver Installer

The Tecan Driver Installer is used to create a setup package for installing custom device drivers (drivers which are not normally included in the Freedom EVOware installation program).

The modular driver concept and the device driver API allows external software specialists to develop and integrate custom device drivers for third party hardware. Contact Tecan for information on additional drivers which are available for special applications. Please contact the Tecan software specialists for information on the device driver API.

The Tecan Driver Installer is provided on the Freedom EVOware installation CD and must be installed separately.

After installing this tool, you can start it with Start > All Programs > Tecan > Driver Installer > Driver Installer Editor:

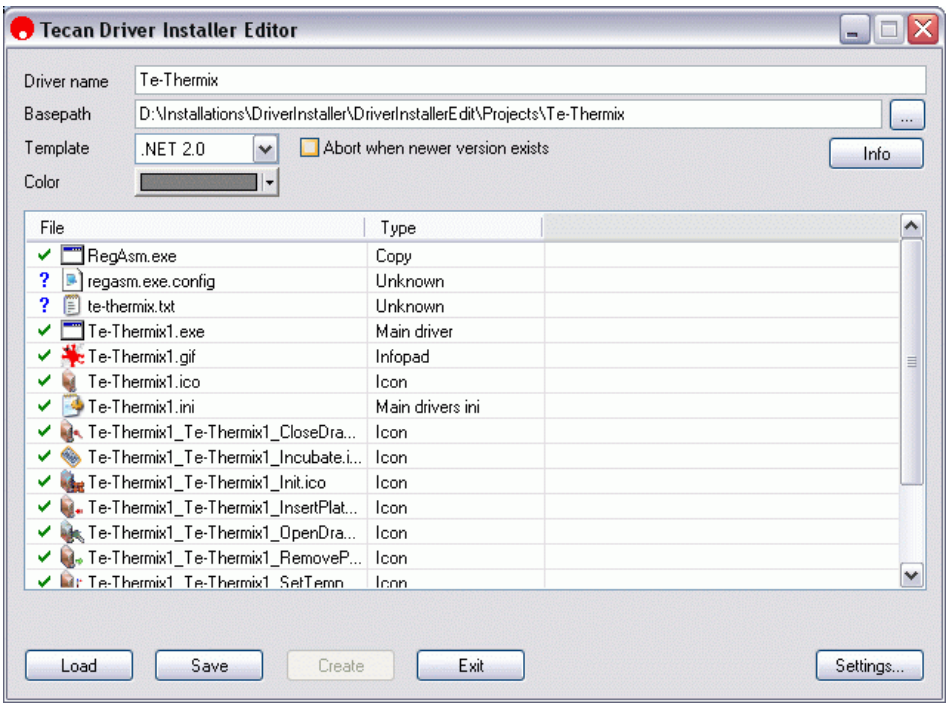


Fig. A-44 *Driver Installer Editor - Main screen*

The Driver Installer Editor is used to specify the software components which are required by the driver and to make some general settings.

The software components for drivers are typically stored in a directory structure. Click the browse button at the right of the *Base path* field and choose the base directory of the software components. Refer to the device driver API documentation for information on developing Freedom EVOware drivers and on the components which are required.

If necessary, change the setting in the Template pull-down list to match the framework (development environment) of the driver (none, .NET 1.1, .Net 2.0 or Visual Basic). The none setting is appropriate for drivers which have been developed using the Borland development environment.

Then specify a name for the driver in the Driver name field. This name will be shown in the InstallShield Wizard and in Add or Remove Programs in the

Windows Control Panel. The driver name which is shown in Freedom EVOware is specified in the ini file for the driver.

Click the Info button and specify the required project information.

The checkbox *Abort when newer version exists* should normally be checked. This prevents users from installing an older driver version than the one which is already installed. “Version” refers to the version of the main driver file (as shown in Windows Explorer in the Properties of the file).

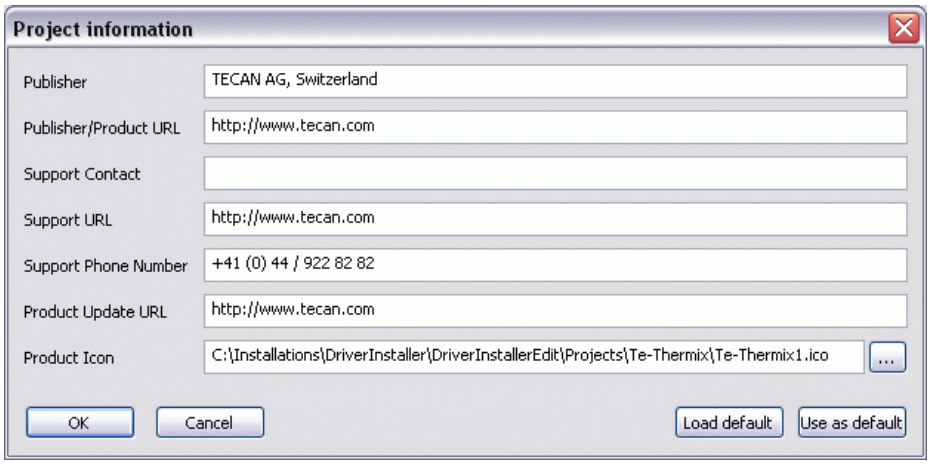


Fig. A-45 *Driver Installer Editor - Project information*

After installing the driver, some of this information in this dialog box can be seen in Windows at Start > Control Panel > Add or Remove Programs > NameOfYourDriver > Support Information.

Buttons at the bottom of the main window

Load

Click this button to load an existing configuration file which specifies the settings and components which are required to install the driver.

Save

Click this button to save a configuration file which specifies the settings and components which are required to install the driver.

Create

Click this button to create the installation program (setup package) in the specified destination directory.

Exit

Click this button to exit the Driver Installer.

Settings

Click this button to specify paths and settings for the Driver Installer:

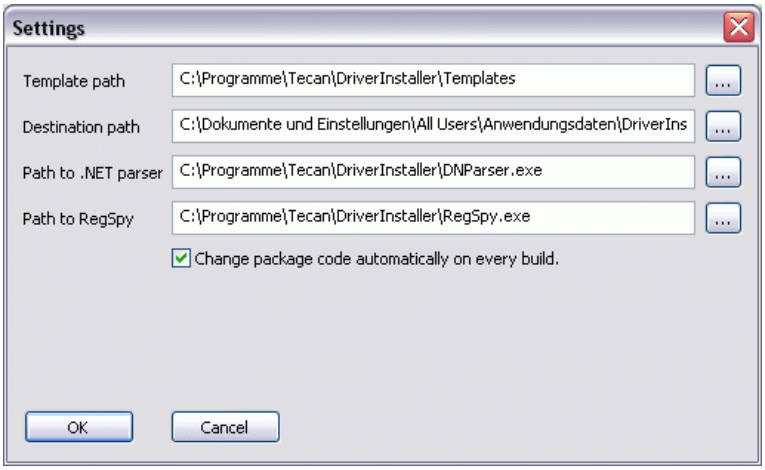


Fig. A-46 *Driver Installer Editor - Settings*

Destination Path specifies the path of the installation program (setup package) which is created.

To allow unique identification by Windows, all setup packages (including different builds or versions of the same setup package) should normally have a unique, random package code (guid). Accordingly, the *Change package code automatically on every build* checkbox should normally be checked. You can uncheck this checkbox if you want to re-create the same setup package for test purposes.

Running the setup package which is created

The Driver Installer Editor creates a standard Windows setup package which uses the InstallShield Wizard. For the above example package, the following dialog box is shown when you double-click the setup.exe file:

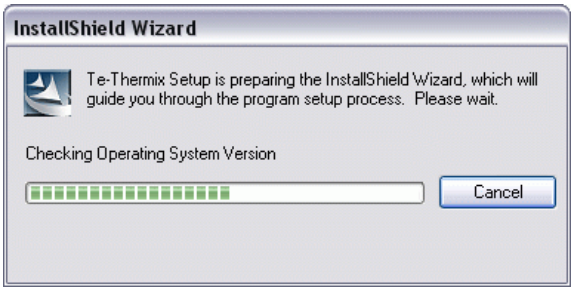

InstallShield Wizard
Te-Thermix Setup is preparing the InstallShield Wizard, which will guide you through the program setup process. Please wait.
Checking Operating System Version
Cancel

Fig. A-47 *Driver Installer - Running the setup package*

A.12 Common Notification Server (CNS)

The Common Notification Server (CNS) is a central Tecan software component which is responsible for sending notification messages to administrators, users or operators of the pipetting instrument. The CNS complements the features of the Notification script command.

Messages can be sent by eMail when particular events occur when running a script or process (e.g. to inform an operator in another room that a process has finished).
In addition:

- Status messages are sent automatically to the currently logged in Freedom EVOware user when the system status changes from idle to running or vice versa and when a job (script or process) starts to run and/or has completed.
- Messages can be sent to specified Freedom EVOware users with the CNS SendNotification command (see 15.70 “CNS SendNotification command”, 15-205).
- The comment text of Comment commands is sent to the currently logged in Freedom EVOware user if the comment text starts with “CNS:”, for example:

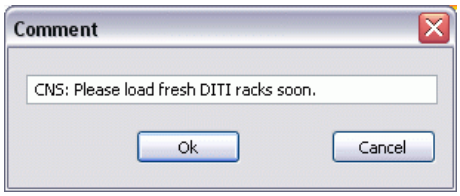


Fig. A-48 *Sending a CNS message using the Comment command*

See 15.37 “Comment Command”, 15-97 for more information.
Furthermore, the CNS setup installs a web server on the Freedom EVOware PC which allows a variety of information to be accessed by users on other PCs which are connected to the local network (LAN). See A.12.1 “CNS Web Server”, A-83.
For users of Windows Vista: The CNS web server provides a download link which allows you to install a Vista gadget (desktop tool or mini-window). The gadget provides information on the following parameters:

- The host name of the PC on which the CNS web server is running.
- Name of the Tecan application which is running (Freedom EVOware).
- Name of the currently logged in user.
- Warning signal (if at least 1 warning was received).
- Error signal (if at least 1 error was received).
- Running State (idle, running).
- Expected end time of the current job.

The Vista gadget gets this information from the CNS web server.

Note: *The icon of the Vista gadget blinks if the script or process has been interrupted, e.g. due to a user prompt or error.*

Disabling messages from the CNS

If you do not want to use the CNS, you can prevent the messages from being sent by deleting the eMail addresses which you have configured in the CNS Configuration Tool.

A.12.1 CNS Web Server

The CNS setup installs a web server on the Freedom EVOware PC which allows a variety of information to be accessed by users on other PCs which are connected to the local network (LAN).

The web server is disabled by default and can be enabled with the CNS Configuration Tool (see A.12.2 “CNS Configuration Tool”, A-84).

The web server provides information on the following parameters:

- The host name of the PC on which the CNS web server is running.
- Name of the Tecan application which is running (e.g. Freedom EVOware).
- Name of the currently logged in user.
- **Warnings tab**: Warning messages, including warning messages from the CNS SendNotification command (see 15.70 “CNS SendNotification command”, 15-205).
- **Errors tab**: Error messages, including error messages from the CNS SendNotification command.
- **Infos tab**: General information, including information and comment messages from the CNS SendNotification command and the texts of Comment commands in the pipetting script. Comment texts which start with underscore (“_”) or “-end” are not shown (see 15.37 “Comment Command”, 15-97 for more information).
- **Jobs tab**: Information on pipetting jobs (scripts or processes) which have been (are being) run.
- If the script or process has has been interrupted, e.g. due to a user prompt or error, a message is shown on the warnings, errors or infos tab. The tab which is used depends on the severity or cause of the interruption.

The information which is shown is cleared each time you start a new pipetting job (script or process).

If your PC is attached to the same network (LAN) as the Freedom EVOware PC, type in the following address in the internet browser to access the CNS web server:

<hostname>:<port>

hostname is the host name or IP address of the PC on which Freedom EVOware is running.

port is the configured port number of the web server. You do not need to specify the port if the CNS web server has been configured to use the default port number (80) for http requests.

Example: http://EVOware_1:8080 or EVOware_1:8080 (http:// is optional)

You can specify “localhost” instead of the host name you want to access the CNS web server from the PC on which Freedom EVOware is running. Example: http://localhost:8080 or localhost:8080.

Tip: The host name of the PC is shown in the CNS web server on the right of the screen. Use this host name if you want to access the web server from another PC on your local network.

A.12.1.1 Security

Unless your company’s internet connection (router or firewall) has been specifically configured to allow this, the CNS web server can only be accessed within your local network and cannot be accessed from the public internet. Contact your network administrator if you need to do this.

A.12.2 CNS Configuration Tool

The Common Notification Server (CNS) is a central Tecan software component which is responsible for sending notification messages to administrators, users or

operators of the pipetting instrument. The CNS Configuration Tool is used to configure the CNS.

Start the configuration tool with the shortcut in Start > All Programs > Tecan > Common Notification Server > Configure.

Enter your user name and password and click the large green arrow. You can only use the CNS Configuration Tool if you have been given Freedom EVOware Administrator access rights. If you want to activate the CNS web server option, you also need Administrator access rights for Microsoft Windows or Windows Vista.

A.12.2.1 User Settings tab

This tab is used to configure the eMail addresses for the CNS notification feature:

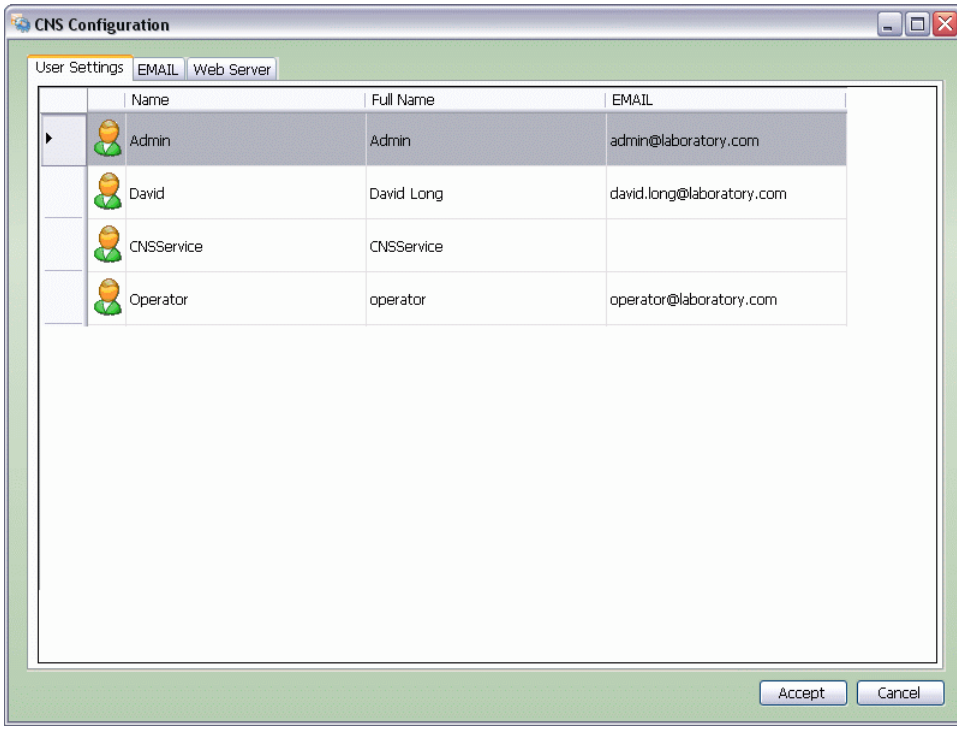


Fig. A-49 *CNS - User Settings tab*

Name

This column shows the names of all of the Freedom EVOware users which are configured in the Tecan User Management System.

Full name

This column shows the full names of all of the Freedom EVOware users which are configured in the User Management System

Email

Specify the eMail address for all of the users to which the CNS should be able to send notification eMails. Status eMails are automatically sent to the currently logged in Freedom EVOware user. In addition, the CNS Send Notification command can be configured to send eMail messages to any other user with a configured eMail address.

When you are finished, click *Accept* to save your changes and close the CNS Configuration Tool. Saving the changes can take several seconds.

A.12.2.2 Email tab

This tab is used to configure the eMail server settings for sending CNS notification messages:

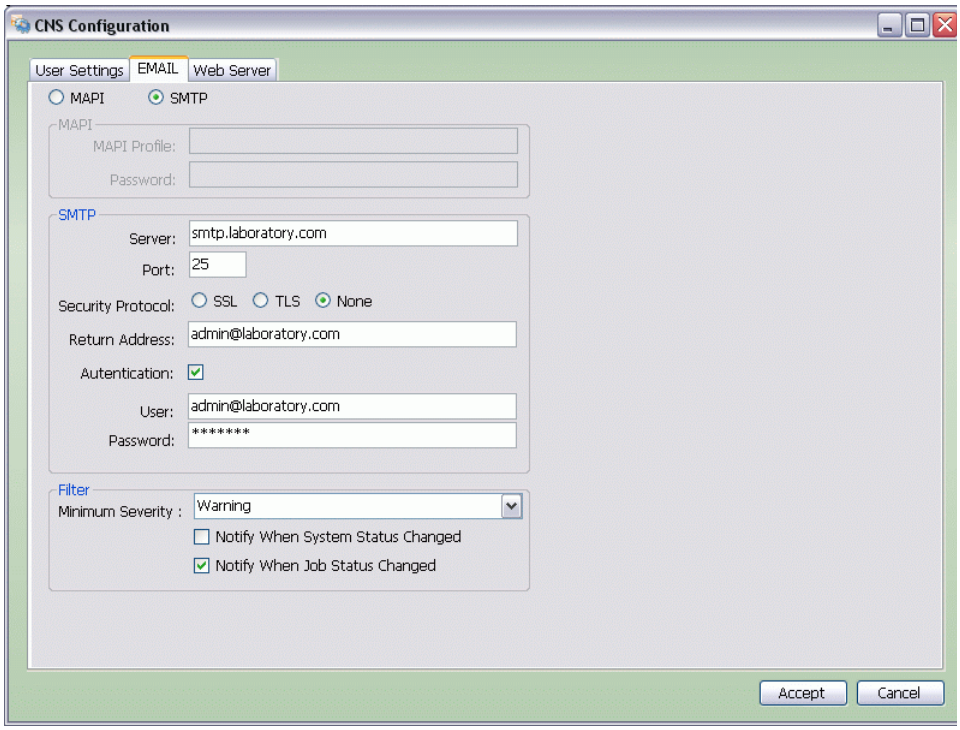


Fig. A-50 *CNS - Email tab*

MAPI panel

Click the MAPI radio button if you want to send the CNS notification messages using MAPI.

MAPI Profile

Specify the MAPI profile you want to use for sending the notification eMails. You can get a list of available profiles by double-clicking the Mail button in the Windows Control Panel. The Mail button will only be present in the Control Panel if you have installed the MAPI service. MAPI is included with many eMail programs such as Microsoft Outlook.

Password

Specify the password for the MAPI profile.

SMTP panel

Click the SMTP radio button if you want to send the CNS notification messages using SMTP

Server

Specify the address of the SMTP server you want to use for sending the eMails. You should normally specify the SMTP server address which is recommended by your eMail provider or eMail administrator.

Port

Specify the SMTP port number (default 25).

Security protocol

SSL (Secure Sockets Layer) and TLS (Transport Layer Security) are protocols which are used for sending secure eMails. You should only choose SSL or TLS if your eMail provider supports them. Ask your eMail provider or eMail administrator for further information.

Return address

Specify the eMail address of a person to whom replies should be sent. The recipient of the notification messages would normally have no reason to reply. But you may receive an automatic error message to the specified return address (delivery failure, “mailer daemon”) if a message is sent but the recipient eMail address you configured on the User Settings tab is incorrect or out of service. If you do not configure a return address, you will not be able to receive the error messages and you may not be aware of the delivery problem.

With some eMail providers, the return address must belong to the same eMail account which is specified with the SMTP (or POP3) user name and password. For example, if the SMTP user name and password are associated with the address david.long@laboratory.com, the CNS may not be able to send eMails if you specify a different return address.

Authentication

Check this checkbox if the SMTP server (mail server) requires authentication to allow eMails to be sent. This is normally the case.

User

Specify the user name for SMTP authentication.

Password

Specify the password for SMTP authentication.

The user name and password for SMTP authentication depends on the SMTP server. In most cases, it is the same user name and password which is used to collect eMails using the POP3 protocol. With some eMail providers, the user name is the same as the eMail address.

Filter panel

This panel is used to configure message filtering settings.

Minimum severity

Choose the minimum message severity for sending automatic notification eMails to the currently logged on user (comment, information, warning or error).

Notify when system status changed

Check this checkbox if you want the CNS to send an automatic notification eMail to the currently logged on user if the system status has changed (e..g from idle to running).

Notify when job status changed

Check this checkbox if you want the CNS to send an automatic notification eMail to the currently logged on user if the job status has changed (e.g. the script or process has started to run or has just finished).

When you are finished, click *Accept* to save your changes and close the CNS Configuration Tool. Saving the changes can take several seconds.

A.12.2.3 Web Server tab

This tab is used to configure the CNS web server:

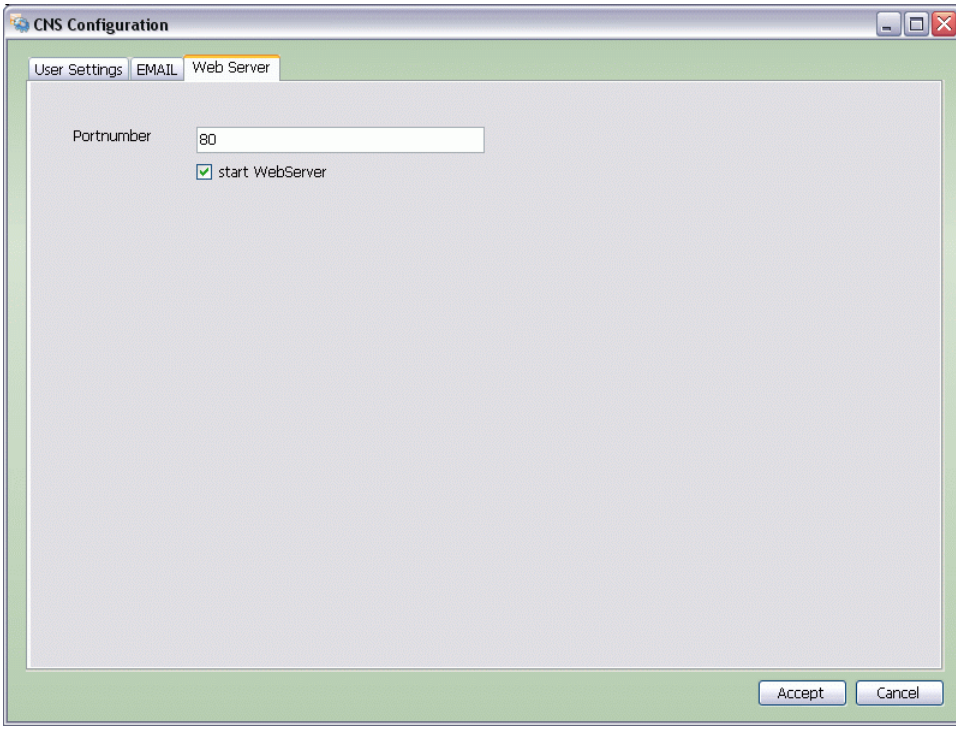


Fig. A-51 *CNS - Web Server tab*

Port number

Specify the IP port number which the web server should use for http requests (default: 80). Use another port number such as 8080 if another application (e.g. a local web server) which is installed and running on the same PC is already using port 80.

Start WebServer

Check this checkbox if you want to start the web server automatically when the PC is started. This checkbox should be checked if you want to use the CNS Web Server feature.

When you are finished, click *Accept* to save your changes and close the CNS Configuration Tool. Saving the changes can take several seconds.

If you activate the web server and you have also activated the Microsoft Firewall on your PC, when you click *Accept* the CNS Configuration Tool will change the firewall settings to allow other PCs on your local network to access the web server. The changes which are made do not allow the CNS web server to be accessed from the public internet (see A.12.1.1 “Security”, A-84).

Changing the firewall settings requires Administrator access rights for Microsoft Windows or Windows Vista. You will get an error message or another message from Microsoft Windows if the CNS Configuration Tool is not able to change the firewall settings.

Proceed as follows if you get an error or information message when you click Accept or if you are not able to access the CNS web server from another PC:

- Click Start > Control Panel, open the firewall configuration and make sure that incoming and outgoing connections are permitted for the service Tecan Common Notification Server 1.0.exe for the IP port number you have

specified in this dialog box. Contact your network administrator for further information.

- If you are using a non-Microsoft firewall on your PC, refer to the manufacturer's user manual for information on making the required settings manually. Contact your network administrator for further information.
- Make sure that the IP port number you have specified is not being used by another application which is installed and running on the same PC - try another port number instead if you suspect that this could be the case.

A.13 ASTM Interface Module

ASTM (American Society for Testing and Materials) is a leading US standards institute. In the context of this manual, ASTM interface refers to a standard for transferring information between medicalx instruments and computer systems through a serial (RS232) connection. The ASTM interface protocol is specified in the two ASTM documents E1381 and E1394. Although this standard has now been superseded by other standards from ANSI/NCCLS, it is still widely used in laboratories for transferring data to and from laboratory information systems.

A laboratory information management system (LIMS) is an overlying software which is used to control the operations to be carried out in a laboratory and to store the results of the tests or assays, normally in a database.

The ASTM interface currently provided with this Freedom EVOware software version only supports data transfer in one direction (from Freedom EVOware to the LIMS). It accepts text files in CSV format, converts the data to the hierarchical data model described in the ASTM specification and sends it to the LIMS through a serial (RS232) connection. The ASTM interface must be configured to match the structure of the input file (number and sequence of fields etc.). A typical application is to convert and transmit data which is output by the Tecan Magellan software for microplate readers. The Magellan software can be controlled by Freedom EVOware.

The ASTM interface module is provided on the Freedom EVOware installation CD and must be installed separately.

A.13.1 Access rights

You can only use the ASTM File Parser if you have been given Freedom EVOware Operator or Application Specialist access rights. You can only use the ASTM Configurator if you have been given Freedom EVOware Application Specialist access rights.

Note: *Currently, you are not authorized to use either of these tools if you are the Freedom EVOware Administrator.*

The Freedom EVOware Administrator provides a temporary password when setting up a new user. When the new user logs in to Freedom EVOware or one of the ASTM tools for the first time, he or she is forced to enter a new, final password.

A.13.2 ASTM File Parser

The main component of the ASTM interface module which is visible to all users is the ASTM File Parser application. Each time the PC is started, the ASTM File Parser starts automatically with the Login dialog box. You can also start this tool with the shortcut in Start > All Programs > Tecan > EVOware > ASTM Extensions.

Enter your user name and password and click OK. You can only use the ASTM File Parser if you have been given Freedom EVOware Operator or Application Specialist access rights.

Note: *Currently, you are not authorized to use this tool if you are the Freedom EVOware Administrator.*

The File Parser can be minimized to a system tray icon (button) at the bottom right of the screen. Double-click on the icon or choose Restore if you want to maximize the ASTM File Parser dialog box.

Right click on the system tray icon to open the context menu. The available choices are Restore, About and Exit.

The File Parser has two modes: Run and Pause. Switch between the two modes by clicking the large buttons at the top of the dialog box:

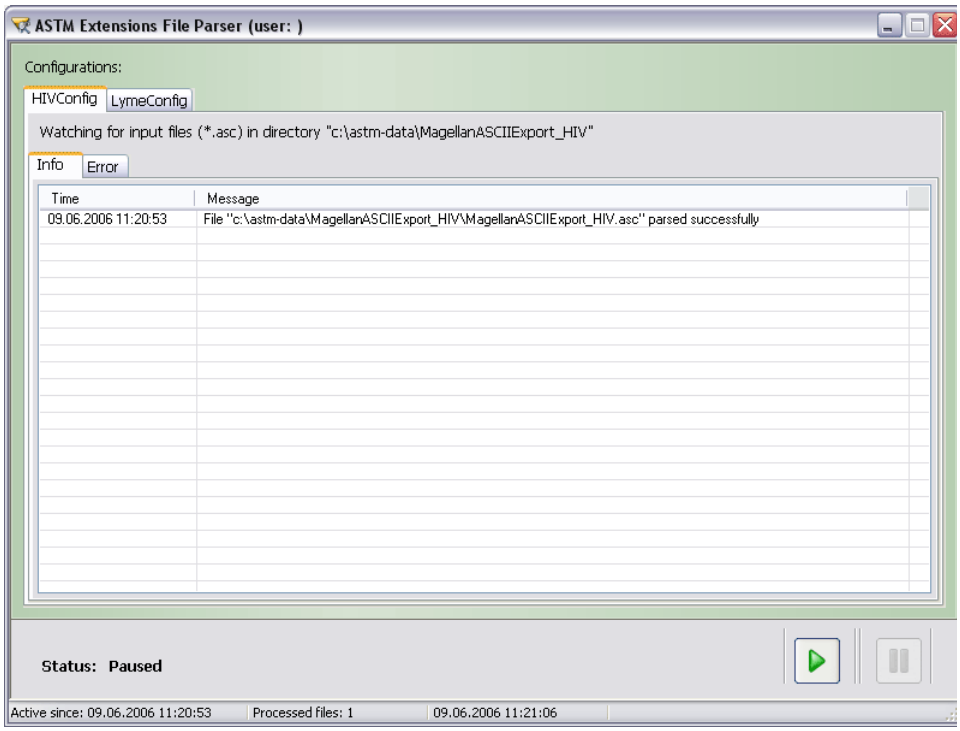


Fig. A-52 *ASTM Extensions File Parser - Info tab*

The current mode is shown at the bottom left of the dialog box and also by the appearance of the system tray icon.

The File Parser runs as a separate process in the background. It continuously polls the configured input directory for CSV files. When it detects a file, it is automatically parsed, converted to the ASTM data model and sent to the LIMS through the configured serial connection.

A success message is displayed in the Info tab of the dialog box when the file has been transferred. The file is then moved to the configured “processed” directory. The processing date and the processing time are appended to the original file name.

If errors are detected during parsing (e.g. the file structure does not match the parser configuration), an error message is displayed in the Error tab of the dialog box and the file is moved to the configured “errors” directory. The processing date and the processing time are appended to the original file name.

Success or failure is also indicated by a notification balloon in the system tray area of the screen.

Remove the shortcut “ASTM Extensions File Parser” from the MS Windows Autostart folder if you want to prevent the File Parser from starting each time the PC is started. You can start this tool manually with the shortcut in Start > All Programs > Tecan > EVOware > ASTM Extensions.

All activities of the ASTM filer parser (start up, shut down and file parsing messages) are written to log files in the same directory as the executable program (default path: <install_path>\ASTM). Each log file is protected with a checksum which is stored in the first line of the file.

A.13.3 Configuration file

The ASTM File Parser is configured with the configuration file MagellanFileWatcherConfig.xml. In addition to general settings for the File Parser and for data communication, the parser configuration file specifies how to map the columns (fields) of the input files to ASTM entities and properties.

The configuration file is protected by a checksum against unauthorized or unintentional modification.

If you edit the ASTM configuration settings, the ASTM File Parser must be re-started in order for the changes to take effect. If you edit the ASTM configuration settings manually instead of using the ASTM Configurator, after making your changes you must repair the checksum of the configuration file by starting the ASTM Configurator and saving the configuration settings again.

A.13.3.1 General settings

Configuration Name=”My Test Config”: The *Name* parameter specifies the name of this configuration set. By duplicating all of the entries between <Configuration> and <\Configuration> using a text editor, you can create a parser configuration file which contains more than one set of parser parameters (see A.13.2 “ASTM File Parser”, A-90). The File Parser operates on all of the parameter sets simultaneously. Accordingly, you **must** configure each of the parameter sets to use a different input directory (SourcePath parameter).

This feature is useful if you want to parse input files (typically from different sources) which have different record structures.

SourcePath: This specifies the directory which will be polled for input files. You can also choose a network directory.

ProcessedPath: Input files which have been successfully parsed and sent to the remote computer are moved to this directory.

ErrorPath: If errors occur when parsing or sending input files, they are moved to this directory.

WatchFilter: This specifies the required file type (file extension) of the input files in the SourcePath directory (default: *.asc). Files with other extensions will be ignored.

Delimiter: This specifies the field separator which is used in the input files (normally “,”).

ChecksumCheck: If you are using the ASTM interface module in a regulated laboratory environment, the input files must be protected by a checksum against unauthorized or unintentional modification. Specify “True” if the input files are protected by a checksum. Specify “False” if the input files are not protected by a checksum.

The Tecan Magellan Tracker software creates output files which are protected by a checksum (currently, the standard Magellan versions do not add a checksum to the output files).

StartProcessingAtLine: File parsing normally starts with the first line of the input file. Specify a line number which is higher than 1 to skip one or more lines at the beginning of the file (e.g. a comment or header).

AmountOfExpectedDataColumns: This specifies the expected number of fields in the input files (i.e. number of field separators +1).

AmountOfExpectedDataLines Check=”True”: This specifies the expected number of records (lines) in the input files. Change “True” to “False” if you do not want the File Parser to check the number of lines in the input file. This setting may be needed for special applications; you should normally specify the number of lines you expect.

DecimalSeparator: This specifies the decimal separator which is used in the input file (“.” or “,”).

The section <ComConfiguration>- </ComConfiguration> is used to configure the parameters of the serial (RS232) interface which is used to send the ASTM data stream to the LIMS:

HostName: This parameter is currently not used; the string you specify will be ignored.

ComPort: Specify the port number of the serial interface.

BaudRate: Specify the data transmission rate (max. 57600 baud).

ByteSize: Specify the number of data bits (7 or 8).

StopBitCode: Specify the number of stop bits (0 = 1 stop bit, 1 = 1.5 stop bits, 2 = 2 stop bits).

ParityCode: Specify the parity (even=e, odd=o, none=n, mark=m, space=s).

DelayAfterEachMessage: Specify an optional delay after sending each message (range: 0 to 5000 ms).

RetryCount: If transmission errors occur, specify how many times to retry (default:” 3”).

ResendMode: If transmission errors occur, specify whether to re-send the entire message (“Complete”) or the last part of the message (“Partial”).

The section <ASTMConfiguration>- </ASTMConfiguration> is used to configure settings for the ASTM data stream which is produced. The parameter values in this section are specified as ASCII codes. Please refer to the ASTM standards specification for more information.

A.13.3.2 Field mapping

The following table shows the hierarchical structure of an ASTM message and illustrates the more common ASTM record types:

Tab. A-12 *ASTM message example showing the hierarchical data model*

Header			
	Patient 1		
		Order	
			Result
		Order	
		Order	
	Patient 2		
		Order	
			Comment
			Result
		Order	
			Result
	Patient 3		

Tab. A-12 *ASTM message example showing the hierarchical data model*

Order	
	Result
Terminator	

Each record type is associated with one or more parameter values or “properties” (the properties are not shown in the above table). For example, the record type “Result” can have the properties UniversalTestID and Measurement.

Note: *An order is a request to carry out a specific laboratory test.*

The ASTM message in the above example contains data for three patients. Output files from the Tecan Magellan software normally only contain data for one patient per record. A typical record structure for a Magellan output file is as follows:

```
HIV_Labcorp,A9,SM1_5,0.09,Negative,
```

The ASTM configuration file example which is described below converts a Magellan output file with the above record structure to an ASTM message with the following structure:

Tab. A-13 *ASTM message example showing records and properties*

Level 0	Level 1	Level 2	Level 3
Header			
	Patient: · LaboratoryAssignedPatientID · PatientIDNo3		
		Order: · UniversalTestIDID	
			Result: · UniversalTestIDID · Measurement
Termi- nator			

In the configuration file MagellanFileWatcherConfig.xml, the mapping of input fields (columns) in the csv file to ASTM entities is specified in the section <Columns> - </Columns>, for example:

```
<Columns>
  <Index Number="1">
     <Class Name="Order" InstanceID="0" ParentInstanceID="0"
        ParentClassName="Patient">
      <Property>UniversalTestIDIdentifier</Property>
     </Class>
  </Index>

  <Index Number="1">
     <Class Name="Result" InstanceID="0" ParentInstanceID="0"
```

```
            ParentClassName="Order">
          <Property>UniversalTestIDIdentifier</Property>
        </Class>
    </Index>

    <Index Number="3">
        <Class Name="Patient" InstanceID="0" ParentInstanceID="0"
            ParentClassName="Header">
          <Property>LaboratoryAssignedPatientID</Property>
        </Class>
    </Index>

    <Index Number="3">
        <Class Name="Patient" InstanceID="0" ParentInstanceID="0"
            ParentClassName="Header">
          <Property>PatientIDNo3</Property>
        </Class>
    </Index>

    <Index Number="4">
        <Class Name="Result" InstanceID="0" ParentInstanceID="0"
            ParentClassName="Order">
          <Property>Measurement</Property>
      </Class>
    </Index>

    <Index Number="5">
        <Class Name="Result" InstanceID="0" ParentInstanceID="0"
            ParentClassName="Order">
          <Property>Measurement</Property>
      </Class>
    </Index>

    <Index Number="6">
        <Class Name="Result" InstanceID="0" ParentInstanceID="0"
            ParentClassName="Order">
          <Property>Measurement</Property>
      </Class>
    </Index>
  </Columns>
```

The significance of each of the above sections in this example is as follows:

Input field 1 is assigned to the “UniversalTestIDIdentifier” property of the “Order” entity with the instance ID “0”. The order entity is a child of the “Patient” entity with the instance ID “0”.

Input field 1 is also assigned to the “UniversalTestIDIdentifier” property of the “Result” entity with the instance ID “0”. The result entity is a child of the “Order” entity with the instance ID “0”.

Input field 3 is assigned to the “LaboratoryAssignedPatientID” property of the “Patient” entity with the instance ID “0”. The patient entity is a child of the “Header” entity with the instance ID “0”.

Input field 3 is also assigned to the “PatientIDNo3” property of the “Patient” entity with the instance ID “0”. The patient entity is a child of the “Header” entity with the instance ID “0”.

Input field 4 is assigned to the “Measurement” property of the “Result” entity with the instance ID “0”. The result entity is a child of the “Order” entity with the instance ID “0”.

Input field 5 is assigned to the “Measurement” property of the “Result” entity with the instance ID “0”. The result entity is a child of the “Order” entity with the instance ID “0”.
Input field 6 is assigned to the “Measurement” property of the “Result” entity with the instance ID “0”. The result entity is a child of the “Order” entity with the instance ID “0”.

Notes:

- Input field 2 is not used.
- The (same) value in input field 1 is assigned to a property of two different ASTM entities. The property name is the same in both cases.
- The (same) value in input field 3 is assigned to a property of two different ASTM entities. The property name is not the same.
- The “Measurement” property of the “Result” entity is assigned three values (ASTM terminology: “components”). The values will be separated in the ASTM data stream by the specified ASTM component delimiter A.13.4.4 “ASTM Configuration tab”, A-101).
- In the example data, there is only one header entity. It’s instance ID is “0”.
- In the example data, there is only one patient entity. It’s instance ID is “0”.
- In the example data, there is only one order entity. It’s instance ID is “0”.
- In the example data, there is only one result entity. It’s instance ID is “0”.

To see the above example configuration in the ASTM Configurator see A.13.4.2 “Column Mapping tab”, A-99.

A.13.4 ASTM Configurator

The ASTM Configurator is used to edit the configuration file for the ASTM File Parser (MagellanFileWatcherConfig.xml). You can edit existing configuration sets and create new configuration sets.
Start this tool with the shortcut in Start > All Programs > Tecan > EVOware > ASTM Extensions. You will be presented with the Login dialog box. Enter your user name and password and click OK. You can only use the ASTM Configurator if you have been given Freedom EVOware Application Specialist access rights.

Note: *Currently, you are not authorized to use this tool if you are the Freedom EVOware Administrator.*

If you edit the ASTM configuration settings, the ASTM File Parser must be re-started in order for the changes to take effect.

A.13.4.1 General tab

This tab is used to make general settings for the ASTM File Parser:

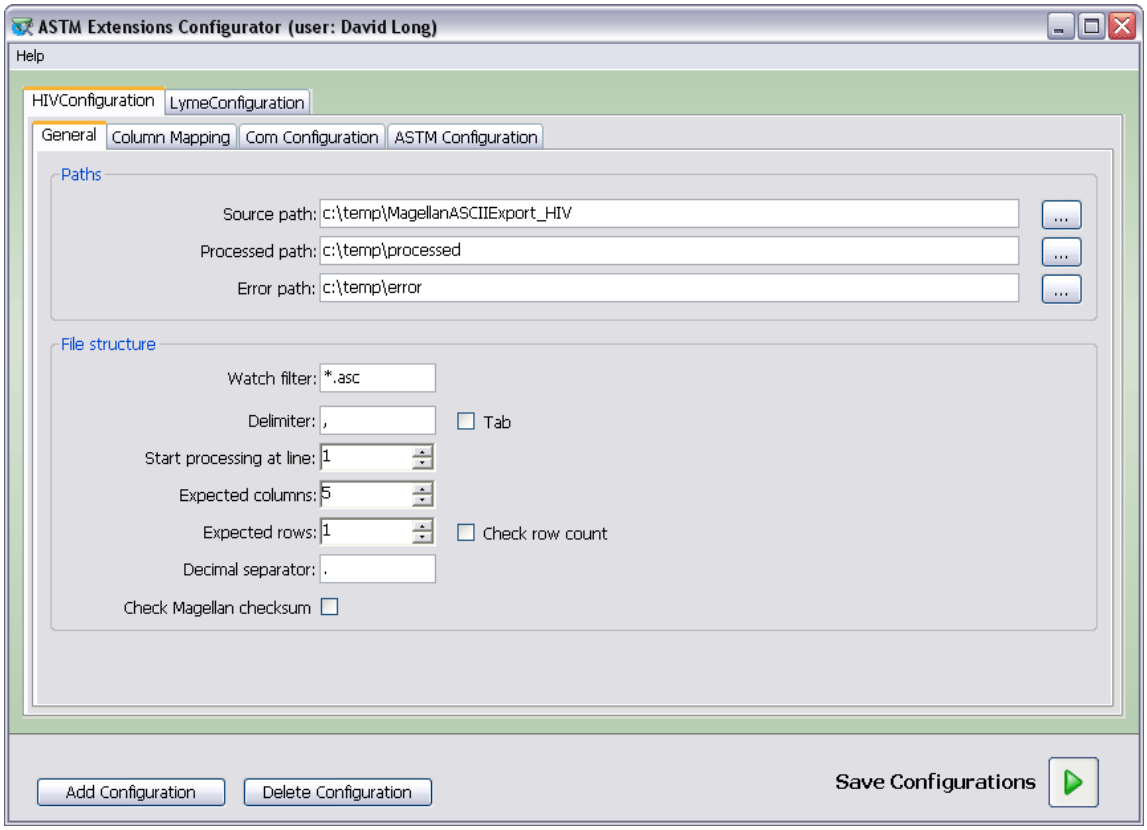


Fig. A-53 *ASTM Extensions Configurator - General tab*

Source path

Specify the directory which will be polled for input files or click the Browse button and browse for the directory. You can also choose a network directory.

Processed path

Input files which have been successfully parsed and sent to the remote computer are moved to this directory. Specify the directory or click the Browse button and browse for the directory.

Error path

If errors occur when parsing or sending input files, they are moved to this directory. Specify the directory or click the Browse button and browse for the directory.

Watch filter

This specifies the required file type (file extension) of the input files in the SourcePath directory (default: *.asc). Files with other extensions will be ignored.

Delimiter

This specifies the field separator which is used in the input files (normally “,”). Check the Tab checkbox if you are using the tab character as a delimiter.

Start processing at line

File parsing normally starts with the first line of the input file. Specify a line number which is higher than 1 to skip one or more lines at the beginning of the file (e.g. a comment or header).

Expected columns

This specifies the expected number of fields in the input files (i.e. number of field separators +1).

Expected rows

This specifies the expected number of records (lines) in the input files. Uncheck the *Check row count* checkbox if you do not want the File Parser to check the number of lines in the input file. This setting may be needed for special applications; the checkbox should normally be checked.

Decimal separator

This specifies the decimal separator which is used in the input file (“.” or “,”).

Check Magellan checksum

If you are using the ASTM interface module in a regulated laboratory environment, the input files must be protected by a checksum against unauthorized or unintentional modification. Check this checkbox if the input files are protected by a checksum.

The Tecan Magellan Tracker software creates output files which are protected by a checksum (currently, the standard Magellan versions do not add a checksum to the output files).

Add Configuration

The parser configuration file can contain more than one set of parser parameters. This feature is useful if you want to parse input files (typically from different sources) which have different record structures. To create an additional configuration set, click the *Add Configuration* button and choose a new, unique name. The name is shown as a tab in the dialog box of the ASTM Configurator.

The File Parser operates on all of the parameter sets simultaneously. Accordingly, you **must** configure each of the parameter sets to use a different source path.

Delete Configuration

Click this button to delete the currently selected configuration set if you no longer want to use it.

Save Configurations

Click this button to save all of your changes. The configuration file is protected by a checksum against unauthorized or unintentional modification. The checksum is also updated when you click this button.

A.13.4.2 Column Mapping tab

This tab is used to specify the mapping of input fields (columns) in the csv file to ASTM entities:

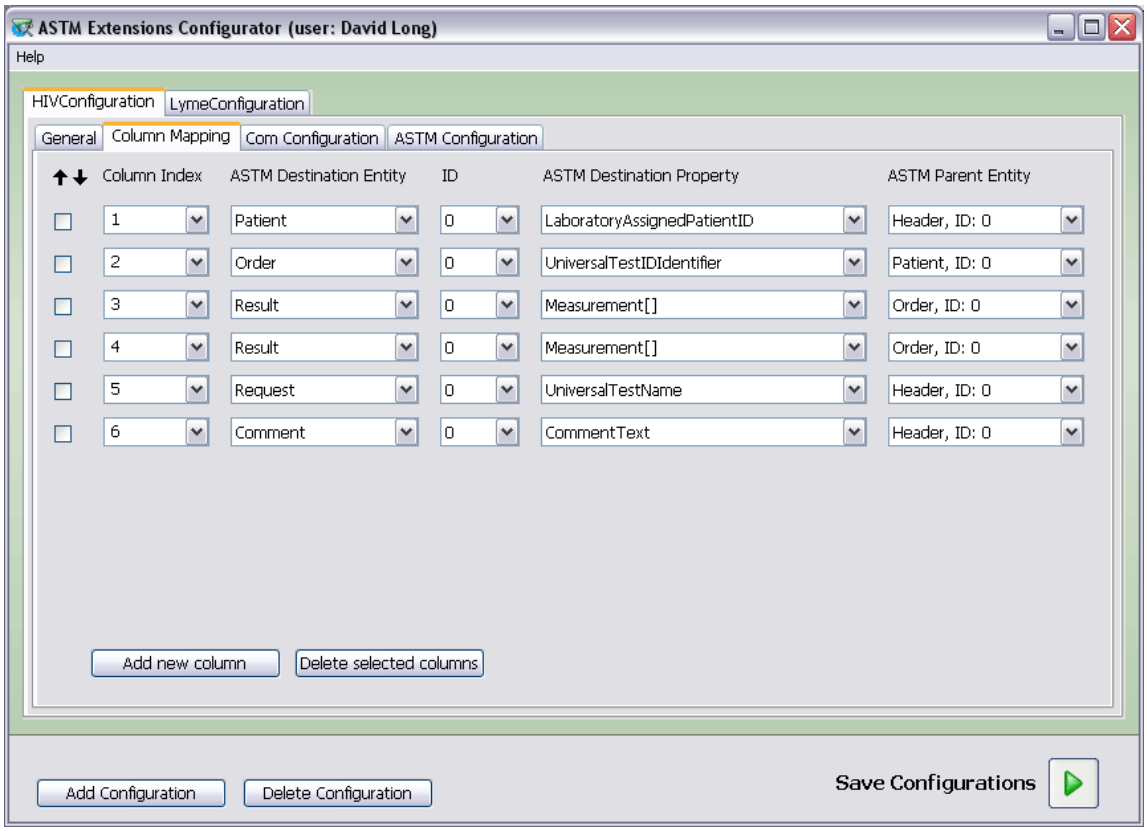


Fig. A-54 *ASTM Extensions Configurator - Mapping tab*

Proceed as follows to create the mapping table:

- Choose the column index (field number of the input file) for the first level 1 entry in the mapping table and choose the required ASTM Destination Entity for this field from the pull-down list. The first level 1 entry is normally the Patient entity. The example shown in Tab. A-13, A-94 only has one level 1 entry (Patient).
- Choose the instance ID of the destination entity.
- Choose the required ASTM Destination Property from the pull-down list. The list only shows properties which are allowed for the chosen destination entity.
- Choose the ASTM entity which is the parent of the destination entity. The list only shows the parent entities which are allowed for the chosen destination entity. The list also shows the instance IDs of the available parent entities. In this example, the parent of the Patient entity is the Header entity. There is always only one Header instance (instance ID = 0).
- Click *Add new column* and specify the next entry in the mapping table. If you finished with all of the level 1 entries, proceed to the level 2 entries (e.g. Order).
- Repeat this process until you have specified all of the required fields in the input file.

Remember to start with the level 1 entry or entries and then proceed to the lower-level entries.

As described in the ASTM Interface Specification, some of the ASTM destination properties can contain more than one component (value). On the Column Mapping tab, ASTM destination properties which allow more than one component are indicated by [] in the pull-down list (e.g. "Measurement[]").

If you assign multiple components (more than one input field) to the same destination property with the same ASTM destination entity and instance ID combination, the values in the transmitted ASTM data stream will be separated by the component delimiter which is specified on the ASTM Configuration tab.

For ASTM destination properties which do not allow multiple components, the mapping table can only contain the destination property once for the same ASTM destination entity and instance ID combination.

Click ↓ or ↑ to sort the entries in the mapping table by column index (field number of the input file). Sorting the entries does not affect the mapping or the sort order in the configuration file, but makes it easier for you to check that all of the fields are correctly assigned.

A.13.4.3 COM Configuration tab

This tab is used to configure the parameters of the serial (RS232) interface which is used to send the ASTM data stream to the LIMS:

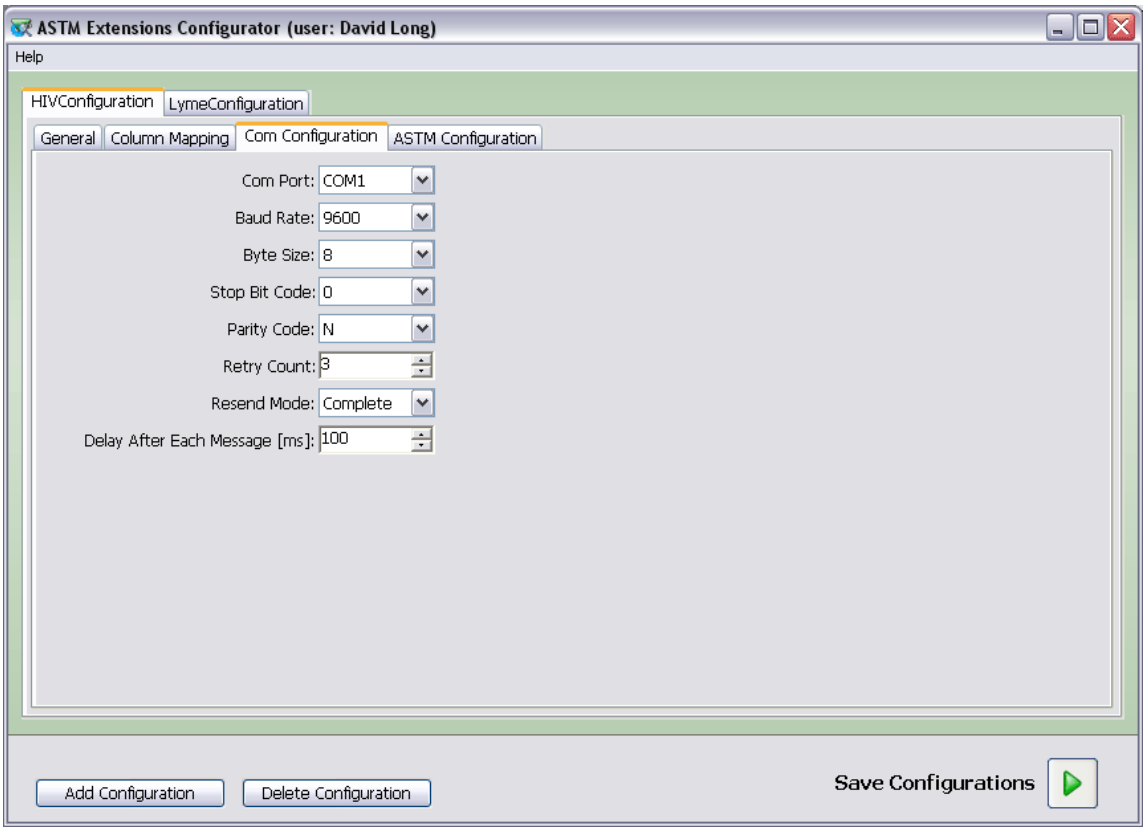


Fig. A-55 *ASTM Extensions Configurator - COM Configuration tab*

Com Port

Specify the port number of the serial interface.

Baud Rate

Specify the data transmission rate (max. 57600 baud).

Byte Size

Specify the number of data bits (7 or 8).

Stop Bit Code

Specify the required number of stop bits (0 = 1 stop bit, 1 = 1.5 stop bits, 2 = 2 stop bits).

Parity Code

Specify the parity (even=e, odd=o, none=n, mark=m, space=s).

Retry Count

If transmission errors occur, specify how many times to retry (default:" 3").

Resend Mode

If transmission errors occur, specify whether to re-send the entire message ("Complete") or the last part of the message ("Partial").

Delay After Each Message

Specify an optional delay after sending each message (range: 0 to 5000 ms).

A.13.4.4 ASTM Configuration tab

This tab is used to configure settings for the ASTM data stream which is produced:

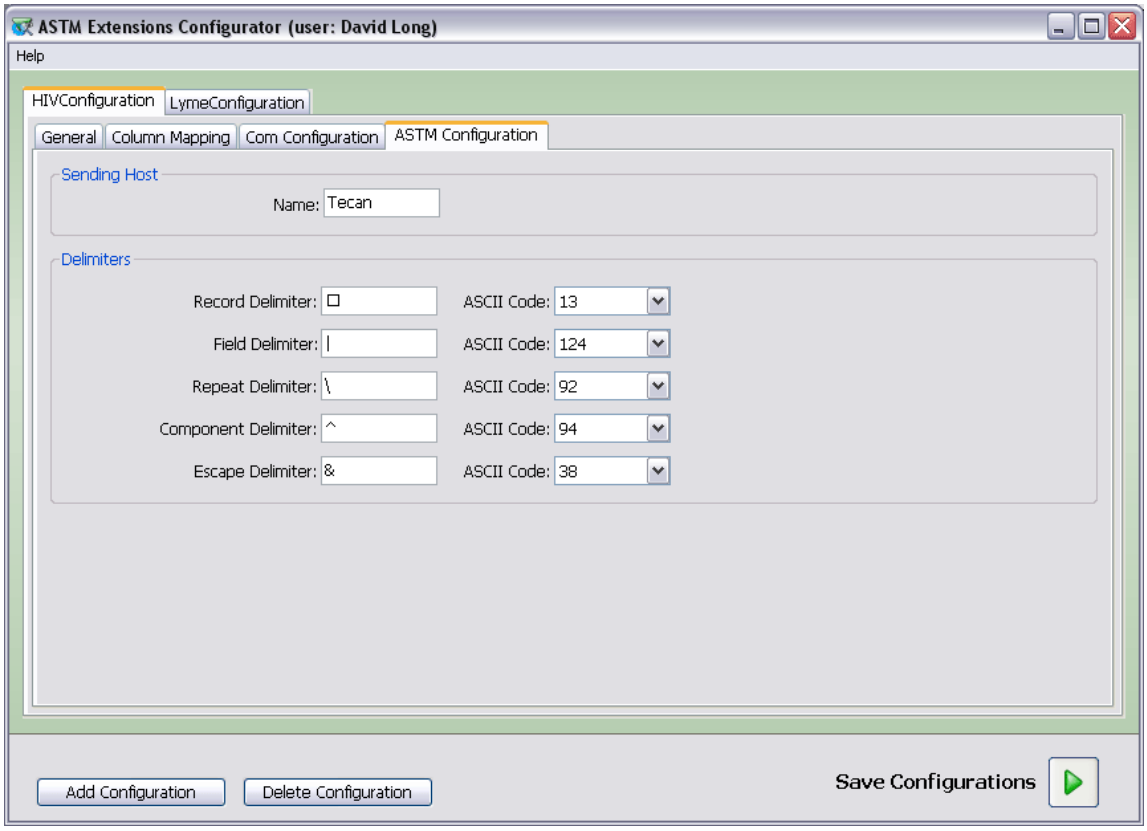


Fig. A-56 *ASTM Extensions Configurator - ASTM Configuration tab*

Sending Host panel

Host Name

The Host Name field is used to indicate to the remote system (e.g. the LIMS) the source of the ASTM data stream. Specify a descriptive name for your PC. For example, you can specify the Windows host name of your PC. The value in the Name field is transmitted in the ASTM data stream in the header field "Sending Name" (see the ASTM specification document E1394, section 7.1.5 for more information).

Delimiters panel

To change the values of the ASTM data stream delimmeters, choose the ASCII code from the pull-down list in the right hand column. The default values for these parameters should not normally be changed except for special applications. Please refer to the ASTM standards specification for more information.

A.14 Configuring and Using the 3D Simulation Tool EVOSim

The Freedom EVOware setup program lets you install a 3D simulation tool (EVOSim) which can be used to visualize the movements which are carried out by the arms of the Freedom EVO pipetting instrument (LiHa, RoMa, PnP and MCA) when running Freedom EVOware scripts and processes. It can also be used to visualize several other devices such as the Te-MO and the PosID-3.

Start EVOSim with the shortcut in Start > All Programs > Tecan > EVOware:

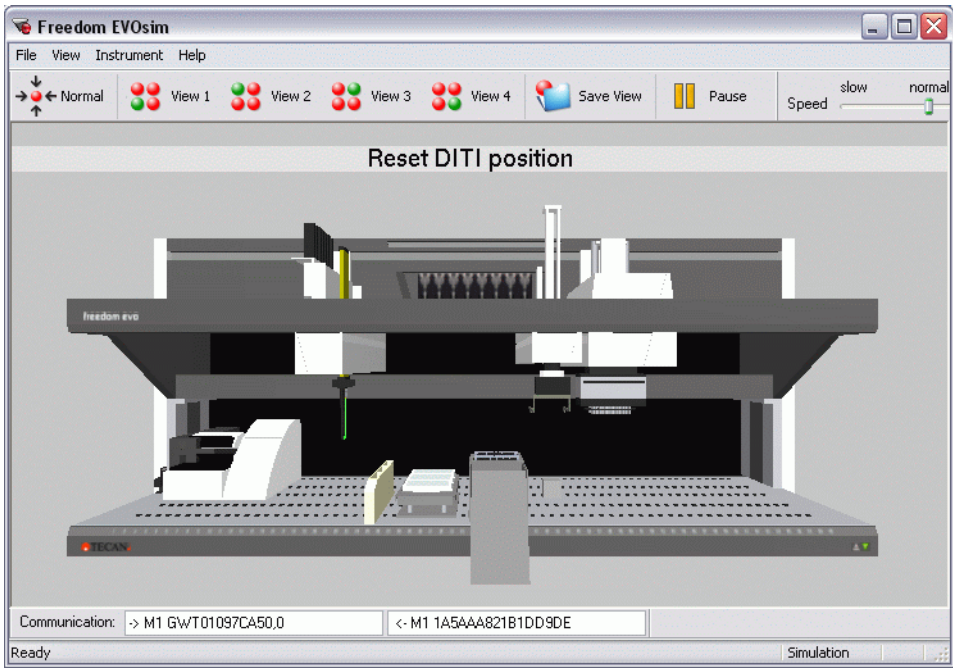


Fig. A-57 *EVOSim - Main window*

EVOSim interprets the firmware (hardware) commands which are sent to the pipetting instrument and sends the appropriate responses to Freedom EVOware. To do this, the RS232 connection to the pipetting instrument is configured to communicate with EVOSim instead. This is called “3D simulation mode”.

Using an additional tool (EVOSim Splitter, see below), EVOSim can also be used to monitor the communication between Freedom EVOware and the pipetting instrument. This is called “monitoring mode”.

When the script or process is running, EVOSim displays the texts from Comment commands in a bar across the top of the screen (see example in the above figure, “Reset DITI position”). The comment texts remain on the screen until the next Comment command is executed. A special syntax of the Comment command can be used to clear the last message which is shown (see 15.37 “Comment Command”, 15-97 for more information).

You can configure EVOSim to run on the same PC which normally controls the pipetting instrument or on another PC.

To install EVOSim, activate the corresponding item in the Software Options group when you install Freedom EVOware. This adds a shortcut for EVOSim and EVOSim Splitter to the EVOware program group of the PC’s Start menu.

To install it on another PC, copy the directory c:\Program Files\Tecan\EVOware\Simulation with all of the files and sub-directories to the other PC. In this case, EVOSim and EVOSim Splitter are started by double-clicking on the respective .exe files in the chosen target directory.

Please note the following points:

- EVOsim can be used to simulate a Freedom EVO pipetting instrument.
- Freedom EVOware does not require a hardlock (dongle) when EVOsim is simulating the pipetting instrument.
- You must start Freedom EVOware in real mode to use EVOSim (firmware commands such as movement commands are not sent to the RS232 port in Freedom EVOware's offline mode).
- Freedom EVOware will run in offline mode if it can not detect either a pipetting instrument or EVOSim, which simulates the data communication with a pipetting instrument. If you are using Freedom EVOware with EVOSim, this normally indicates that there is a problem with the EVOSim configuration or the data connection(s). Note: the Freedom EVOware operation mode is shown in the Status Bar (see 6.7.3 "Status Bar", 6-20).
- EVOSim does not currently simulate the following optional devices: Te-Shake, Te-MagS, Te-Stack, Te-Stack Te-MO and Te-VacS. If you want to use EVOSim, you must first deactivate these devices in the Freedom EVOware Configuration Tool (see 8.4.1.1 "Device Information Tab", 8-21). If you don't do this, Freedom EVOware will report errors when it tries to communicate with these devices.
- EVOSim does not support the Pressure Monitored Pipetting (PMP) hardware option. If PMP is activated in your Freedom EVOware configuration, Freedom EVOware will display an error message when it starts and PMP will be disabled for the current Freedom EVOware session.
- When using EVOSim, you must always start it before you start Freedom EVOware. If you also use EVOSim Splitter, start EVOSim Splitter first, then EVOSim and finally Freedom EVOware.
- If you have been using EVOSim, you must always exit Freedom EVOware before you exit EVOSim (Freedom EVOware sends firmware commands during the shut-down procedure and expects RS232 communications to remain functional during this time).
- EVOSim does not report pipetting errors to Freedom EVOware (such as *DITI already mounted*). The only errors it reports are incorrect positioning commands ("movement out of range"). Out of range movements are also indicated by displaying the respective arm (LiHa, RoMa, PnP) in red. Note: For mechanical reasons, Freedom EVOware purposely sends movement commands which are out of range during pipetting instrument initialization.
- If you want to run two copies of EVOSim on the same PC (not normally meaningful), first make a duplicate copy of the directory c:\Program Files\Tecan\EVOware\Simulation with all of the files and sub-directories. Do not start two copies of EVOSim from the same directory (conflicts are caused by the shared configuration file).

A.14.1 Communication Between EVOSim and Freedom EVOware

Depending on requirements, the simulation tool can communicate with Freedom EVOware in several different ways:

A): EVOSim runs on the same PC as Freedom EVOware. The PC must have two unused RS232 ports. Connect the two ports using a null-modem cable. Configure Freedom EVOware to use one of the ports and configure EVOsim to use the other port.

B): EVOSim runs on the same PC as Freedom EVOware. Configure EVOsim to provide a virtual RS232 port. EVOsim then temporarily re-configures Freedom EVOware to use the same port.

C): EVOSim runs on a different PC to Freedom EVOware. Each of the PCs must have one unused RS232 port. Connect the two PCs using a null-modem cable. Configure the ports appropriately. You must also provide a network connection between the two PCs.

D): EVOSim is used in monitoring mode (see A.14.2 “Data Splitter Tool EVOSim Splitter”, A-105).

See A.14.4.1 “Communication Between EVOSim and Freedom EVOware”, A-108 for more information.

A.14.2 Data Splitter Tool EVOSim Splitter

EVOsim is also provided with a data splitter tool (EVOSim Splitter) which duplicates the RS232 data stream over a network connection:

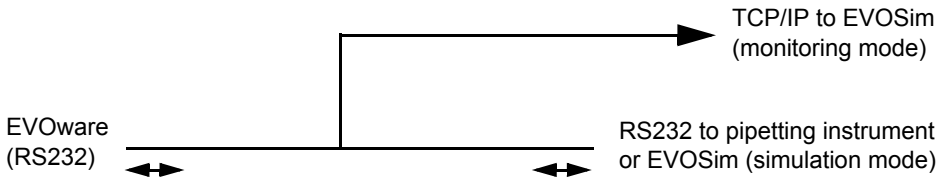


Fig. A-58 *Principle of the data splitter tool EVOSim Splitter*

The RS/232 connection is bi-directional. The splitter tool only provides a uni-directional TCP/IP connection. The EVOSim which is connected to the splitter connection cannot be used to simulate a pipetting instrument - it can only be used for monitoring (Freedom EVOware requires a bi-directional data connection). So EVOSim Splitter can only be used **in addition to** a physical pipetting instrument or another copy of EVOSim running in 3D simulation mode.

EVOSim Splitter can be used in several different scenarios. The two most common are as follows:

E): Freedom EVOware is connected to a pipetting instrument using an RS232 cable. EVOSim is used to monitor the progress of the pipetting on another PC (which may be in a different room).

F): One copy of EVOsim runs on the same PC as Freedom EVOware, configured as in case A) or B), above. A second copy of EVOSim running on another PC is connected to the first PC through EVOSim Splitter. Both copies of EVOSim show the same simulation. The EVOSim copy on the first PC can be minimized to allow the whole screen to be used for Freedom EVOware. This arrangement can be useful for demonstration purposes in cases where an RS232 cable connection between the two PCs is not possible or should be avoided.

Note: *If you use EVOSim Splitter, you must always provide a network connection between the two PCs.*

See A.14.4.1 “Communication Between EVOSim and Freedom EVOware”, A-108 for more information.

A.14.3 Using EVOSim Splitter

EVOSim Splitter is only needed if you plan to use EVOSim in monitoring mode and should only be run on the PC where Freedom EVOware is installed. Start EVOSim Splitter before you start EVOSim. This displays the SplitterCtrl dialog box which shows you the host name of the PC where EVOSim Splitter is running. Specify the same host name in the Communication dialog box in EVOSim. EVOSim Splitter does not have any configuration settings.

Click Accept in the SplitterCtrl dialog box to minimize EVOSim Splitter to the system tray. It will then be shown as a small round icon at the bottom right of the screen.

Right click the EVOSim Splitter icon to show a context menu with the following items:

Exit

Quit EVOSim Splitter.

Info

Show the info screen for EVOSim Splitter.

About

Show the About box for EVOSim Splitter.

A.14.4 EVOSim Configuration Wizard

The EVOSim Configuration Wizard is used to specify the required configuration of the simulated pipetting instrument. The configuration must be chosen to match the requirements of the scripts and/or processes which you want to run in Freedom EVOware. For example, if your script uses a PnP, you must also configure a PnP in EVOSim.

You must specify the instrument configuration before you connect to Freedom EVOware for the first time during the current EVOSim session. You cannot change the instrument configuration after the connection to Freedom EVOware has been established.

The starting screen of the EVOSim Configuration Wizard is as follows:

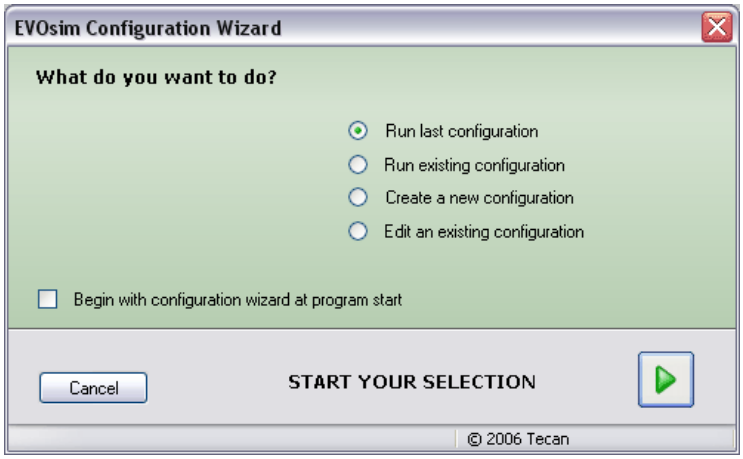


Fig. A-59 *Starting screen of the Configuration Wizard*

The options in the starting screen are as follows:

Run last configuration

This option runs EVOSim with the configuration settings you chose last time EVOSim was run. This option is only shown if EVOSim has already been run.

Run existing configuration

When you click Next you will be prompted to chose a previously saved configuration file. Choose the configuration file you want to use and click Next. You are then prompted to choose the communication mode you want to use. Note: EVOSim configuration files are stored in the Config sub-directory of the EVOSim installation path (normally ..\simulation\Config).

Create a new configuration

This starts a wizard which helps you to specify the required configuration settings for EVOSim. You will be prompted to choose the Freedom EVO (pipetting instrument) version, specify the cutouts in the worktable of the pipetting instrument, make settings for simulation of the loading interface hardware option (see A.14.5 “Simulating the Loading Interface”, A-109), specify the instrument arms which you want to simulate (LiHa RoMa PnP MCA) and specify additional devices (Te-MO and PosID-3).

Uncheck the corresponding checkboxes if you want to skip the configuration steps for the worktable cutouts and the loading interface.

If you configure a LiHa, you must specify the tips which are fitted.

The LiHa configuration 8 Plus 1 Access for the Freedom EVO 75 pipetting instrument is currently only intended for disposable tips (not fixed tips). In addition, the same DITI type (DITI size) must be fitted to all 8 positions of the LiHa (see A.7 “Freedom EVO 75 Pipetting Instrument - LiHa Configuration”, A-30).

If you configure a RoMa, you will be prompted to specify the arm length, the home (parking) position and the type of gripper you want to use.

If you configure the Te-MO, you will be prompted to specify the Te-MO sites that you want to reserve for the Wash Block, the DiTi rack and for putting down the Tipblock (these objects can only be put on the middle slide of the Te-MO).

If you configure the MCA, you must specify whether it is fitted with the gripper option or not.

You will be prompted to save a configuration file when you have made your settings. EVOSim configuration files are saved in the Config sub-directory of the EVOSim installation path (normally ..\simulation\Config). After saving the file, you will prompted to choose the communication mode you want to use (see A.14.4.1 “Communication Between EVOSim and Freedom EVOware”, A-108).

Edit an existing configuration

When you click Next you will be prompted to chose a previously saved configuration file. You can then edit and run the existing configuration settings.

Begin with configuration wizard at program start

Check this checkbox if you want EVOSim to start with the wizard when you run it next time. If this checkbox is not checked, you can start the wizard again later by choosing Configuration in the Machine menu.

Note: *You cannot change the configuration settings after the connection to Freedom EVOware has been established.*

A.14.4.1 Communication Between EVOSim and Freedom EVOware

The last step of the configuration wizard - regardless of the options you choose on the starting screen - is to configure the communication mode you want to use:

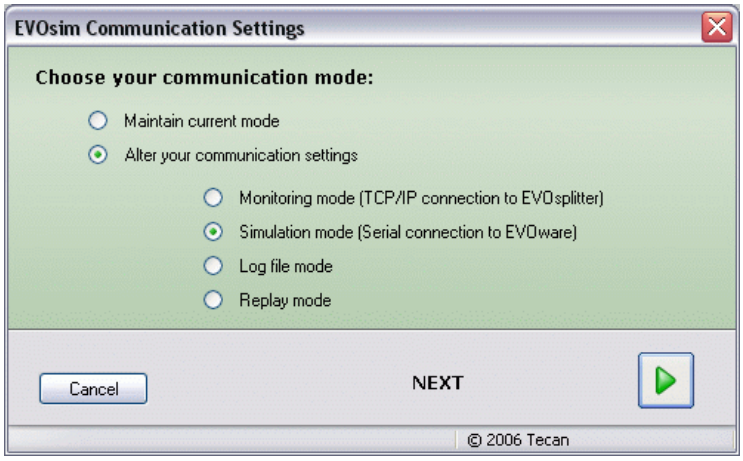


Fig. A-60 *EVOSim - Communication settings*

The available options are as follows:

Maintain current mode

This starts EVOSim with the communication mode which was last used.

Alter your communication settings

Choose this option if you want to choose a different communication mode. Click Next when you have made your choices.

Monitoring mode (TCP/IP connection to EVOSim Splitter)

Choose this option if you are using EVOSim Splitter (see A.14.2 “Data Splitter Tool EVOSim Splitter”, A-105). In the next wizard screen, you are prompted to choose the computer which is running Freedom EVOware and EVOSim Splitter, as follows:

Location: Choose the PC where Freedom EVOware is installed from the pull-down list. The *Host name or TCP/IP address* field then shows the host name or the TCP/IP address of the chosen PC. The list shows the entries which you previously stored in the EVOSim configuration.

Add Location: Click this button to add a new entry to the *Choose location* pull-down list. Specify a descriptive name for the PC (e.g. EVOware PC) and specify the PC’s host name or TCP/IP address. Tip: If you are also using EVOSim Splitter, EVOSim Splitter’s dialog box tells you the host name of the PC.

If you want to use EVOSim together with EVOSim Splitter, start EVOSim Splitter before you start EVOSim (see A.14.3 “Using EVOSim Splitter”, A-106).

Simulation mode (serial connection to Freedom EVOware)

Choose this option if EVOSim communicates with Freedom EVOware through an RS232 cable or a virtual RS232 port.
Simulator connects to a physical port: Specify the RS232 port to use. The list shows the addresses of all physical RS232 interfaces which are installed in your PC.

This option also requires a network connection between the two PCs (the network connection is used to exchange information on the current worktable layout). In the next wizard screen, you are prompted to choose the computer which is running Freedom EVOware, as follows:

Location: Choose the PC where Freedom EVOware is installed from the pull-down list. The *Host name or TCP/IP address* field then shows the host name or the TCP/IP address of the chosen PC. The list shows the entries which you previously stored in the EVOSim configuration.

Add Location: Click this button to add a new entry to the *Choose location* pull-down list. Specify a descriptive name for the PC (e.g. EVOware PC) and specify the PC's host name or TCP/IP address. Tip: If you are also using EVOSim Splitter, EVOSim Splitter's dialog box tells you the host name of the PC.

Simulator connects to a virtual port: Specify the virtual RS232 port which you want to use. The list only shows ports which are not assigned to physical RS232 interfaces. EVOsim then temporarily re-configures Freedom EVOware to use the same port.

Log File mode

In this mode, EVOSim, parses and then simulates the pipetting operations and robot arm movements which are contained in a Freedom EVOware log file (see A.1.1 "Structure of Log Files of Type EVO", A-2). Log File mode can be used e.g. for demonstration or diagnostic purposes.

In log file mode, the EVOSim main window has an additional area on the left (the "Log File Bar") which is divided into two panels, *Files* and *Commands*. Choose *Log file bar* in the *View* menu to show or hide the Log File Bar.

To use this feature, proceed as follows:

- Create a log file of type EVO by running a pipetting script. You can also use a log file from a colleague which has been sent to you e.g. by eMail.
- Drag the log file from Windows Explorer onto the *Files* panel of the Log FIle Bar. The file will be parsed and the *Commands* panel will list the instrument firmware commands in the log file which are relevant to EVOSim.
- If required, you can drag and drop several log files onto the *Files* panel of the Log FIle Bar. In the *Files* panel, the files will be sorted in alphabetical order of the file names (this is normally equivalent to the chronological order of the log files).
- Click *Run* to run the simulation. Click *Stop* to pause the simulation. You can then click *Step* to run the simulation one firmware command at a time.
- Click *Restart* to move all of the arms (LiHa, RoMa, PnP, Te-MO and/or MCA) and the PosID-3 back to the starting position at the left side of the EVOSim worktable.

Note: *For meaningful results in Log File mode, make sure that EVOSim is configured with the same worktable layout, optional devices and pipetting instrument configuration which were used by the script or process which was logged.*

Replay mode

See A.14.9 "Replay Package feature", A-112.

A.14.5 Simulating the Loading Interface

The Loading Interface is a hardware option for the pipetting instrument which detects when labware items (typically tube racks) are put onto the worktable (or

removed again). It requires special labware which is fitted with a small magnet which activates a proximity switch.

The presence or absence of the labware is reported to Freedom EVOware. In addition, Freedom EVOware can control LEDs fitted to the front edge of each grid position to indicate to the operator that labware should be exchanged and/or should not be exchanged. The Loading Interface is normally controlled by the Sample Oriented EVOware software add-on. Sample Oriented EVOware provides special script commands which allow you to specify which grid positions are significant and should be monitored by the Loading Interface hardware.

Activate the Loading Interface simulation with the checkbox and click Configure to choose the grid positions which will be monitored by Freedom EVOware. The selected grid positions are marked with a short black bar (only visible if you zoom in and tilt your view of the pipetting instrument). During (simulated) script or process run time, choose Loading Ports in EVOSim's Settings menu and click a grid position checkbox to indicate that labware has been put on the worktable (or removed).

A.14.6 EVOSim Views

Click and drag the simulation with the left mouse to change the perceived viewing angle of the user (above or below the simulation, to the left or the right of the simulation). Alternatively, use the Left, Right, Up and Down cursor keys on the numeric keypad.

Click and drag the simulation with the right mouse to tilt and rotate the simulation. Alternatively, press <Ctrl> on the keyboard and use the Left, Right, Up and Down cursor keys on the numeric keypad.

Use the scrolling wheel of the mouse to change the perceived distance of the user from the simulation (zoom effect). Alternatively, press <Shift> on the keyboard and use the Up and Down cursor keys on the numeric keypad.

A.14.7 EVOSim Toolbar

Click **Normal** to switch to normal view of the simulation.

Click **View 1, 2, 3** or **4** to switch to one of four stored views of the simulation.

Click **Save View** and then View 1, 2, 3 or 4 to store the current view as view 1, 2, 3 or 4.

Click **Pause** to pause the running simulation. Click this button again to resume the simulation.

Speed: This slider lets you choose the required speed of the simulation. You can also use it to change the speed when the script or process is already running.

A.14.8 EVOSim Menus

A.14.8.1 File Menu

Export configuration

This menu item saves the current EVOSim configuration as an EVOSim configuration file. EVOSim configuration files should be saved in the Config sub-directory of the EVOSim installation path (normally ..\simulation\Config). You can then run or edit the saved configuration using the EVOSim

configuration wizard (see A.14.4 “EVOSim Configuration Wizard”, A-106). If EVOSim is currently displaying a worktable from the last simulation run, this menu item also saves the EVOSim worktable (the wizard option *Create a new configuration* does not save an EVOSim worktable).

This feature is above all useful for log file mode. The simulation in log file mode is more instructive if you can also see the worktable which was used when creating the log files. If you plan to send the log files to someone else for discussion or analysis, it is helpful to send the saved EVOSim configuration file, too.

Create Replay Package

See A.14.9 “Replay Package feature”, A-112.

Exit

This menu item is used to exit EVOSim. Always exit Freedom EVOware before you exit EVOSim (Freedom EVOware sends firmware commands during the shut-down procedure and expects RS232 communications to remain functional during this time).

A.14.8.2 View Menu

Communication Bar

This menu item is used to show or hide the Communication Bar.

Speed Bar

This menu item is used to show or hide the Speed Bar.

View Bar

This menu item is used to show or hide the View Bar.

Log File Bar

This menu item is used to show or hide the Log File Bar (two panels *Files* and *Commands* at the left edge of the EVOSim main window). You can only choose this menu item if you have chosen Log File Mode (see Log File Mode in A.14.4.1 “Communication Between EVOSim and Freedom EVOware”, A-108).

Window always on top

Select this menu item if you want the EVOSim window to always be on top of the other windows.

Perspective

This menu item is used to configure advanced features for the 3D visualization. Appropriate settings are dependent on your graphics card and graphics driver. If you change the settings to extremely large or small values, this can slow down simulation considerably due to the increased time required for graphics rendering.

A.14.8.3 Instrument Menu

Restart

Move all of the arms (LiHa, RoMa, PnP, Te-MO and/or MCA) and the PosID-3 back to the starting position at the left side of the EVOSim worktable. This option is mainly intended for log file mode (see A.14.4.1 “Communication Between EVOSim and Freedom EVOware”, A-108, Log File Mode). You should not choose Restart when the simulation is running - this can lead to unexpected results.

Configuration

This menu item is used to specify the required configuration of the simulated pipetting instrument. See A.14.4 “EVOSim Configuration Wizard”, A-106 for more information.

Loading ports

During (simulated) script or process run time, choose this menu item and click a grid position checkbox in the *Loading Ports* dialog box which is shown to indicate that labware has been put on the worktable (or removed). Freedom EVOware only monitors the grid positions (ports) which you have selected in Instrument Config in EVOSim’s EVOware menu.

Link Labware to Graphics

The database in EVOSim includes graphics templates for most common types of labware, carriers and device carriers. EVOSim’s list of labware, carriers and device carriers is updated automatically if a new, unknown object is used on the worktable in Freedom EVOware. If the object you want to use is not already assigned to a graphics template, it is initially shown as an empty box. Use this menu item to assign it to the template of another object which has a similar appearance.
Hide element: Do not show the chosen object.
Show box: Show the chosen object as an empty box. Use this option if you cannot find a graphics template with a similar appearance.
Link to template: Assign the chosen object to the graphics template which is selected in the right hand panel.

See also Fig. A-61, A-117 and A.14.11 “Adding custom labware to EVOSim”, A-115.

Show safety shield / Hide safety shield

This menu item shows and hides the safety shield of the Freedom EVO pipetting instrument in the simulation window.

Open Door / Close Door

This menu item opens and closes the safety door of the Freedom EVO pipetting instrument in the simulation window.

A.14.8.4 Help Menu

Error Logging

This menu item opens the Error Messages dialog box which shows internal messages from EVOSim. The Error Messages dialog box is only intended for internal use.

Show Help

This menu item opens the online help for EVOSim. You can also get the online help for EVOSim by pressing F1.

About EVOSim

This menu item shows information on the Freedom EVOware version which is installed and Tecan copyright information.

A.14.9 Replay Package feature

The Replay Package feature is used to create a pre-configured installation package for EVOSim which can be sent to customers or Tecan sales personnel for the purpose of demonstration. The package includes a special configuration file (replay file) which allows EVOSim to simulate pre-recorded pipetting operations and robot arm movements without needing to install Freedom

EVOware on the destination PC. The replay file also contains information on the worktable layout, optional devices and pipetting instrument configuration. The installation package is a small self-extracting, self-installing ZIP file (size ca. 1.5 MB) which you can send e.g. by eMail.

Compatibility:

- The replay package feature has been tested on the destination PC with the same Windows versions which are supported by Freedom EVOware.
- The replay package may also run correctly on the destination PC with other Windows versions.

To use the replay package feature, proceed as follows:

- Start EVOSim, start Freedom EVOware and run the pipetting script or process which you want to record.
- In EVOSim, choose *Create Replay Package* in the *File* menu, browse to a suitable directory and specify the required name of the replay package.
- It is recommended to choose a name which gives some indication of the script or process which has been recorded, e.g. “EVO150WithLiHa”.
- You can save the replay package in any directory except the EVOSim installation directory.
- EVOSim then creates a self-extracting ZIP file containing the pre-configured EVOSim installation package, the replay file and all of the settings which are needed.
- If required, you can create the replay package while the script or process is still running, or create several replay packages which illustrate different stages of the same script or process. All of the replay packages will start running from the beginning of the script or process.
- Send the replay package file to the customer, e.g. via eMail.

On the destination PC

- Double-click the replay package file on the destination PC to extract the files, install EVOSim and start the replay automatically.
  - The customer will be prompted for the required installation directory.
  - The customer will be asked whether a desktop shortcut to the replay package should be created.

When the replay has finished running, double-click the desktop shortcut to run it again (or click Run in EVOSim). If required, you can install more than one replay package on the same destination PC (in different directories) and run them simultaneously.

Note: *Installing the replay package does not make any changes to the registry of the destination PC and is not shown in the Start menu of the PC.*

Note: *The replay package does not include a help file. The replay package feature of EVOSim is described in the Freedom EVOware help file and manual.*

Proceed as follows to entirely remove the EVOSim replay installation from the destination PC:

- Delete the chosen installation directory and all of the files inside.
- Delete the desktop shortcut.

Note: *When installing the replay package, the customer’s anti-virus package may report a potentially unsafe program “hidden install”.This program is part of the replay package and the message can be ignored.*

Testing the replay package

Proceed as follows if you want to test the replay package before sending it to the customer:

- Create the replay package file in a temporary directory on the source PC as described above and install and run it from the temporary directory. This will not interfere with any other EVOSim installations on the same PC.

Alternatively:

- Create the replay package as described above
- Switch the communication mode of EVOSim to Replay Mode (see A.14.4.1 “Communication Between EVOSim and Freedom EVOware”, A-108).

  In replay mode, the EVOSim main window has an additional area on the left (the “Replay Bar”) which contains a *Commands* panel.
- Using Windows Explorer, drag the replay file onto the *Commands* panel of the Replay Bar. Replay files are created in the Replay sub-directory of the EVOSim installation path (normally ..\simulation\Replay). The replay file has the same (chosen) name as the replay package, but has the extension .erp instead of .exe.
- The file will be parsed and the *Commands* panel will list the instrument firmware commands in the log file which are relevant to EVOSim. The replay will start automatically.
- Click *Run* to run the replay again. Click *Stop* to pause the replay. You can then click *Step* to run the replay one firmware command at a time.
- Click *Restart* to move all of the arms (LiHa, RoMa, PnP, Te-MO and/or MCA) and the PosID-3 back to the starting position at the left side of the EVOSim worktable.

Note: *For meaningful results when testing the replay file, make sure that EVOSim is configured with the same worktable layout, optional devices and pipetting instrument configuration which were used by the script or process which was recorded. See also* *A.14.10 “Command Line Parameters (EVOSim)”, A-115.*

Note: *In replay mode, some of the EVOSim menu items (such as Configuration in the Instrument menu) are not available. If Freedom EVOware is installed on the same PC, restart EVOSim if you want to switch to another mode.If Freedom EVOware is not installed on the same PC, after switching to replay mode you cannot switch back to another mode.*

Tips when creating the replay package

Proceed as follows if you want to ensure that the replay package you create will start with the intended worktable layout (instead of starting with an empty worktable which is replaced by the intended worktable after a short initialization delay):

- Start EVOSim, start Freedom EVOware and load the pipetting script or process which you want to record. EVOSim should now show the worktable layout which is intended for the script or process.
- In EVOSim, choose *Export Configuration* in the File menu to create a configuration file which contains the worktable layout (see A.14.8.1 “File Menu”, A-110, *Export Configuration*).
- Quit Freedom EVOware and quit EVOSim.
- Restart EVOSim, choose *Configuration* in the Instrument menu, choose *Run existing configuration* and choose the configuration file which you saved

previously. EVOSim should now show the worktable layout which is intended for the script or process.

- Restart Freedom EVOware and run the pipetting script or process which you want to record.
- In EVOSim, choose *Create Replay Package* in the File menu, browse to a temporary directory and specify the required name of the replay package.

A.14.10 Command Line Parameters (EVOSim)

EVOSim supports the following command line parameters:

***Tab. A-14** Command Line Parameters (EVOSim)*

Switch	Explanation
-c <config_file>	Start EVOSim with the specified configuration file using the communication mode which was last used (see A.14.4 “EVOSim Configuration Wizard”, A-106). By creating several desktop shortcuts to EVOSim.exe with different parameters, this feature makes it easy to switch between different worktable layouts, simulated hardware devices and Freedom EVO versions. a)
-c <replay_file>	Start EVOSim with the specified replay file using the EVOSim configuration settings which were last used. b)

a) EVOSim configuration files are stored in the Config sub-directory of the EVOSim installation path (normally ..\simulation\Config).

b) By default, EVOSim creates replay files in the Replay sub-directory of the EVOSim installation path (normally ..\simulation\Replay). See A.14.9 “Replay Package feature”, A-112 for more information.

For meaningful results, it is recommended to run the replay using the same EVOSim configuration settings (worktable layout, simulated hardware devices and Freedom EVO version) with which the replay file was recorded. You can specify the -c parameter as well to make sure that the correct settings are used, e.g.

EVOSim -c ConfigFile -r ReplayFile.

You do not need to specify the file extension for the configuration file or the replay file. You should not specify the path to the file(s) - only specify the file name(s).

The above command line parameters can be included in desktop shortcuts to EVOSim.exe. Use Windows Explorer to create a desktop shortcut and edit the properties of the shortcut to specify the parameters.

A.14.11 Adding custom labware to EVOSim

If required, you can extend the EVOSim labware library with CAD drawings of custom labware, carriers and devices (device carriers) which have been saved in VRML 2.0 (Virtual Reality Modelling Language) format. This format can be created using popular CAD programs such as TurboCAD Version 9 or 10, AutoCAD and ProE.

Installing a dynamically linked device

Dynamically linked devices are devices whose position in EVOSim is updated according to the worktable layout (grid position) in Freedom EVOware.

1. Export the drawing from your CAD program in VRML 2.0 format.
2. Copy the VMRL file to the \layout\vrml sub-directory of your EVOSim installation (e.g. ..\EVOware\simulation\layout\vrml). The file extension must be wrl.
3. Edit the file VRMLDevice.tab in the \layout sub-directory of your EVOSim installation to add a new section for the new device as follows (the example shows the PW384 Device Carrier):

```
Design {
    Header {
        Name        ; PW384DeviceCarrier //display name
        Type        ; DeviceCarrier // parameter no longer used
    }
    SubDesign {
        Design    ; PW384Design
    }
}
Design {
    Header {
        Name        ; PW384Design
    }
    VRML {
        Name           ; PW384 //device carrier name
        File           ; PowerWasher384.wrl
        Scale        ; 1
        Position       ; 4475,-4500,0
        Rotation       ; 0,0,2700
        VRMLOrigin    ; Corner
    }
}
```

whereby *Scale* is a scaling factor for the size of the object in EVOSim, *Position* is an offset for the x, y and z axis (in 0.1 mm) and *Rotation* specifies a rotation of the x, y and z axis (in 0.1° steps). You should normally only specify rotation for the z axis. On each line, everything following "//" is an optional comment.

4. Edit the file VRMLDevice.ini in the \layout sub-directory of your EVOSim installation to add a new section for the new device as follows:

```
[PW384DeviceCarrier]
Type=DeviceCarrier
Element0Design=VRMLDevice.tab;PW384DeviceCarrier
```

Note:

For VRML carriers, specify Type=Carrier
For VRML labware, specify Type=Labware

5. In EVOSim, choose *Link Labware to Graphics*… in the Instrument menu to link the newly added CAD drawing to a device carrier as follows:

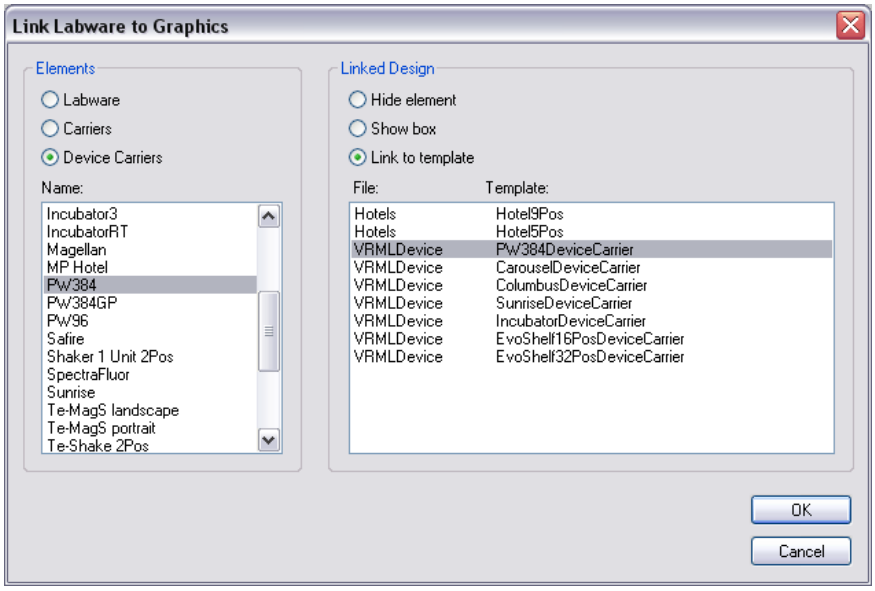


Fig. A-61 *Assigning labware to graphics objects*

6 Proceed as follows if the required device carrier is not shown in the Device Carriers list on the left hand side of the dialog box:
a) Return to the EVOSim main window and start Freedom EVOware.
b) Create a worktable which includes the required device carrier.
c) EVOSim will be notified about the new device carrier, and will add a new entry to the [DeviceCarrierLinks] section of the EVOSim.ini file automatically. The new device carrier should now be visible on the EVOSim worktable and also in the Device Carriers list in the above figure. To avoid the risk of typing mistakes, we do not recommend adding the new entry to EVOSim.ini manually.
d) Return to step 5.

Use the same procedure for new labware and carriers.

7 Restart EVOSim.

Installing a fixed device

Fixed devices are devices which are always displayed in EVOSim at the same worktable position. The position is not dependent on the worktable layout in Freedom EVOware.

1. Export the drawing from your CAD program in VRML format.
2. Copy the VMRL file to the \layout\vrml sub-directory of your EVOSim installation (e.g. ..\EVOware\simulation\layout\vrml). The file extension must be wrl.
3. Edit the file ExternalDevices.tab in the \layout sub-directory of your EVOSim installation to add a new section for the new device with the following syntax:

```
Design {
    Header {
        Name                ; Devices
    }
    VRML {
        Name                ; PW384
        File                ; PowerWasher384.wrl
        Scale             ; 0.5
        Position            ; 8000,-5000,3000
        Rotation            ; 0,0,2700
        VRMLOrigin         ; Corner
    }
}
```

whereby *Scale* is a scaling factor for the size of the object in EVOSim, *Position* is an offset for the x, y and z axis (in 0.1 mm) and *Rotation* specifies a rotation of the x, y and z axis (in 0.1° steps). You should normally only specify rotation for the z axis. On each line, everything following "//" is an optional comment.

4. Restart EVOSim.

Note: *Your changes will be lost if you update or re-install EVOSim - keep a backup of your work. Be aware that the structure and syntax of the .tab and .ini files may change in future EVOSim versions.*

A.15 Advanced Worklist Commands

This section describes the advanced worklist commands. Advanced worklist commands are specified in Freedom EVOware worklists, normally in combination with the standard worklist commands. See 15.24.2 "Worklist File Format", 15-39.

Compared to standard worklist commands, which allow six basic pipetting operations to be carried out on samples, the advanced worklist commands give you full control of pipetting actions, including control over arm movements.

In some cases, the name of the advanced worklist command differs from the corresponding script command. This is indicated in the text alongside the command.

For an alphabetical list of advanced worklist commands refer to *Advanced worklist commands* in the index. In some cases, the names of the commands differ from the command names in advanced worklists for the Tecan Gemini software. This

applies above all to commands which are implemented in Freedom EVOware as device commands.

Each of the advanced script commands is provided with a syntax example. The examples are also useful when developing software add-ons for the automatic generation of pipetting scripts.

Freedom EVOware has extensive facilities for validating pipetting scripts. However, it is not possible to validate advanced worklists - it is the user's responsibility to check for errors. For example, if you specify a loop option in an advanced worklist command, you must make sure that the loop you specify is also contained in the advanced worklist. If you specify a liquid class, you must make sure that the liquid class is available in your Freedom EVOware installation.

Note: *The advanced worklist commands are only intended for research applications. You must not use them in worklists for general purpose applications.*

Note: *Some of the commands are not available in Freedom EVOware Plus. This is indicated in the text alongside the command.*

Note: *Advanced Worklist commands are always executed in single pipetting mode.*

A.15.1 Command Syntax and Parameter Types

A worklist file is a text (ASCII) file. Worklist files can contain a mixture of standard worklist commands and advanced worklist commands. Each of the commands is specified on a separate line. For information on the syntax of the six standard worklist commands see 15.24.2 "Worklist File Format", 15-39.

Advanced worklist commands for script commands have one or more parameters which are enclosed in round brackets and separated by commas. Each command is prefixed by "B;" (break command) and terminated with a semicolon.

Advanced worklist commands for device commands have five parameters which are enclosed in round brackets and separated by commas. Each command is prefixed by "B;FACTS" and terminated with a semicolon. The first two parameters are the device name and the command name.

Each sequence of one or more advanced worklist commands must be preceded by a Wash command ("W;"). The wash operation uses the first wash scheme which you configured in the Worklist command.

See A.15.2 "Example Worklist with Three Advanced Worklist Commands", A-119.

There are four different parameter types:

- **Integer** - number without a decimal point;
- **Floating point number** - number with a decimal point;
- **Expression** - constructed from variables, operators and/or floating point numbers, enclosed in double quotation marks
- **String1**, enclosed in double quotation marks.
- **String2**, not enclosed in quotation marks.

A.15.2 Example Worklist with Three Advanced Worklist Commands

The following example worklist contains three advanced worklist commands. One of them is a script command (Execute) and two of them are device commands (Carousel_InitCarousel and Carousel_PresentPlate).

The following example pipettes, initializes the carousel, gets a plate, executes an external application and pipettes again:

A;S1;;Microplate, landscape;1;;10

D;D1;;Microplate, landscape;1;;10

W;

B;FACTS("Carousel","Carousel_InitCarousel","","0","");

B;FACTS("Carousel","Carousel_PresentPlate","2,5","1","96_Well_Plate");

B;Execute("c:\notepad.exe",2,"");

A;S1;;Microplate, landscape;2;;10

D;D1;;Microplate, landscape;2;;10

W;

A.15.3 Well Selection

Many of the advanced worklist commands have a parameter called wellSelection. wellSelection is a string which specifies the wells (tips) which should be used for the command.

Characters 1 and 2 of the string specify the number of wells in the x-direction in hexadecimal. Characters 3 and 4 of the the string specify the number of wells in the y-direction in hexadecimal. For example, 12 x 8 (96 wells) = 0C08.

All following characters are used for the well selection, whereby each character specifies the well selection for a group of 7 adjacent wells using a specially adapted bitmap system. Only 7 bits are used per byte instead of 8 to avoid screen and printer font compatibility problems. Using the 7-bit system, 14 characters are needed to represent the well selection for 96 wells (plus characters 1 to 4, total of 18 characters) and 55 characters are needed to represent the well selection for 384 wells (total of 59 characters).

In addition, since most ASCII characters below ASCII 32 are non-printable (non-human-readable), decimal 48 (ASCII value for “0”) is added to the value of the bitmap to make it easier to read, send by eMail etc. The following shows some examples for character 5 of the well selection string for a 96-well microplate in landcape orientation.

Character 5 is responsible for the first group of 7 wells, A1 to G1 (wells are counted from rear to front and then from left to right):

A1 = bin. 0000001 = dec. 1. Add 48, result = 49 (ASCII value for “1”)

B1 = bin. 0000010 = dec. 2. Add 48, result = 50 (ASCII value for “2”)

C1 = bin. 0000100 = dec. 4. Add 48, result = 52 (ASCII value for “4”)

D1 = bin. 0001000 = dec. 8. Add 48, result = 56 (ASCII value for “8”)

E1 = bin. 0010000 = dec. 16. Add 48, result = 64 (ASCII value for “@”)

F1 = bin. 0100000 = dec. 32. Add 48, result = 80 (ASCII value for “P”)

G1 = bin. 1000000 = dec. 64. Add 48, result = 112 (ASCII value for “p”)

A1 + E1 = bin. 0010001 = dec. 17. Add 48, result = 65 (ASCII value for “A”)

etc.

No wells selected = bin. 0000000 = dec. 0. Add 48, result = 48 (ASCII for “0”)

Note: *H1 (and A2 to F2) are coded in character 6 of the well selection string, not character 5.*

The above examples result in following well selection strings:

A1 = “0C0810000000000000

B1 = “0C0820000000000000”

C1 = “0C0840000000000000”
D1 = “0C0880000000000000”
E1 = “0C08@0000000000000”
F1 = “0C08P0000000000000”
G1 = “0C08p0000000000000”
A1 + E1 = “0C08A0000000000000”
no wells selected = “0C0800000000000000”

Note: *H1 = “0C0801000000000000”*

Freedom EVOware can be used to calculate a well selection string for you automatically as follows:

Create a simple script which only contains an Aspirate command. Select the wells you want to use and save the script. Script files are saved with the extension .esc in the ..\EVOware\Database\Scripts directory. Open the resulting .esc file with a plain text editor and copy the well string from the parameters of the Aspirate command (see A.15.4.1 “Aspirate command (Worklist: Aspirate)”, A-123).

The following example C++ function can be used to generate the well selection string automatically (the example assumes that the wells only have one compartment, see *Well compartments* in the index):

```
CString RPG_RackZoom_Button::getSelection()
{
   if (m_rack == NULL)
      // no rack selected
      return "";

   // this function stores 7 bit per character in the selection
string
   // the first 2 characters are the number of wells in x-
direction
   // the characters 3 and 4 are the number of wells in y-
direction
   // well are computed in the order back to front, left to right
   CString selString;

   // troughs
   int yWells = m_rack->yWells;
   if (m_rack->tipAccess > 1)
      yWells = m_rack->tipAccess;

   // system liquids
   if (m_rack->systemType == ST_System)
      yWells = theApp.m_roboInfo.tips[0];

   if (m_rack == NULL)
      return "0000";
   selString.Format("%02X%02X",m_rack->xWells,yWells);
   unsigned int bitCounter = 0;
   unsigned int bitMask = 0;
   for (int x=0;x<m_rack->xWells;++x)
      for (int y=0;y<yWells;++y)
      {
         if (m_selFlag[x][y] & 1)
            bitMask |= (1 << bitCounter);
         if (++bitCounter > 6)
         {
            selString += (char)('0' + bitMask);
            bitCounter = 0;
            bitMask = 0;
         }
      }
   if (bitCounter > 0)
      selString += (char)('0' + bitMask);

   return selString;
}
```

A.15.4 Advanced Worklist Commands for Script Commands

The following describes the advanced worklist commands which correspond to Freedom EVOware script commands.

All advanced worklist commands which are equivalent to Freedom EVOware script commands are described (if the script command is not listed in this section, a corresponding advanced worklist command is not available).

A.15.4.1 Aspirate command (Worklist: Aspirate)

The advanced worklist command which corresponds to the Aspirate script command is “Aspirate”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.1 “Aspirate Command”, 15-1.

***Tab. A-15** Advanced worklist command Aspirate, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	liquidClass	string1		liquid class name
3 - 14	volume	expr[12]		12 expressions which specify the volume for each tip. Specify 0 for tips which are not used or not fitted.
15	grid	integer	1 - 67	labware location - carrier grid position
16	site	integer	0 - 127	labware location - (site on carrier - 1)
17	spacing	integer	1 - ...	tip spacing
18	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)
19	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 20 - 22 are included n times, where n = noOfLoopOptions.[a)]
20	loopName	string1		loop name
21	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
22	difference	integer		number (“vary by”) which is used for the loop action (parameter 10)
23	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:
Aspirate(15,"Water","5.5","5.5","4.5","4.5",”0”,”0”,”0”,”0”,”0”,”0”,”0”,”0”,15,2,1,"0C0
80N000000000000",0,0);

A.15.4.2 Dispense (Worklist: Dispense)

The advanced worklist command which corresponds to the Dispense script command is “Dispense”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.2 “Dispense Command”, 15-3.

***Tab. A-16** Advanced worklist command Dispense, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	liquidClass	string1		liquid class name
3 - 14	volume	expr[12]		12 expressions which specify the volume for each tip. Specify 0 for tips which are not used or not fitted.
15	grid	integer	1 - 67	labware location - carrier grid position
16	site	integer	0 - 127	labware location - (site on carrier - 1)
17	spacing	integer	1 - ...	tip spacing
18	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)
19	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 20 - 22 are included n times, where n = noOfLoopOptions.[a)]
20	loopName	string1		loop name
21	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
22	difference	integer		number (“vary by”) which is used for the loop action (parameter 10)
23	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:
Dispense(255,"Water","5.5","5.5","4.5","4.5",”0”,”0”,”0”,”0”,”0”,”0”,”0”,”0”,15,2,1,"0
C08000000p¯000000",0,0);

A.15.4.3 Mix (Worklist: Mix)

The advanced worklist command which corresponds to the Mix script command is “Mix”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.3 “Mix Command”, 15-5.

***Tab. A-17** Advanced worklist command Mix, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	liquidClass	string1		liquid class name
3 - 14	volume	expr[12]		12 expressions which specify the volume for each tip. Specify 0 for tips which are not used or not fitted.
15	grid	integer	1 - 67	labware location - carrier grid position
16	site	integer	0 - 127	labware location - (site on carrier - 1)
17	spacing	integer	1 - ...	tip spacing
18	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)
19	cycles	integer	0 .. 100	number of mixing cycles
20	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 21 - 23 are included n times, where n = noOfLoopOptions.[a)]
21	loopName	string1		loop name
22	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
23	difference	integer		number (“vary by”) which is used for the loop action (parameter 11)
24	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:

Mix(15,"Water","5.5","5.5","4.5","4.5”,”0”,”0”,”0”,”0”,”0”,”0”,”0”,”0”,15,2,1,"0C08000
0030000000",1,0,0);

A.15.4.4 Wash Tips (Worklist: Wash)

The advanced worklist command which corresponds to the Wash Tips script command is “Wash”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.4 “Wash Tips Command”, 15-8.

Tab. A-18 *Advanced worklist command Wash, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	wasteGrid	integer	1 - 67	waste location - grid position
3	wasteSite	integer	0 - 127	waste location - site number
4	cleanerGrid	integer	1 - 67	cleaner location - grid position
5	cleanerSite	integer	0 - 127	cleaner location - site number
6	wasteVol	expression	0 - 100	volume in waste in ml
7	wasteDelay	integer	0 - 1000	delay before closing valves in waste in ms
8	cleanerVol	expression	0 - 100	volume in cleaner in ml
9	cleanerDelay	integer	0 - 1000	delay before closing valves in cleaner in ms
10	Airgap	floating point	0 - 100	volume of airgap in µl which is aspirated after washing the tips (system trailing airgap)
11	airgapSpeed	integer	1 - 1000	speed of airgap aspiration in µl/s
12	retractSpeed	integer	1 - 100	retract speed in mm/s
13	FastWash	integer	0 - 1	1 = use fast-wash-module
14	lowVolume	integer	0 - 1	1 = use pinch valves
15	atFrequency	integer	50 - 1500	frequency for Active Tips in Hz. Note Active Tips are no longer supported by Freedom EVOware; specify 0 in this field.
16	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

Example:
Wash(255,2,1,2,2,"2.0",500,"1.0",500,10,70,30,0,0,1000,0);

A.15.4.5 Get DITIs (Worklist: GetDITI)

The advanced worklist command which corresponds to the Get DITIs script command is “GetDITI”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.7 “Get DITIs Command”, 15-13.

Tab. A-19 *Advanced worklist command GetDITI, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	1 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	type	integer	0 - 3	DITI index (see 9.4.5 “Labware Types and DITI Types”, 9-32, DITI Index).
3	options	integer	0 - 1	bit-coded options: 1 = if diti not fetched try 3 times then go to next position
4	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

Example:

```
GetDITI(240,0,0,0);
```

A.15.4.6 Drop DITIs command (Worklist: DropDITI)

The advanced worklist command which corresponds to the Drop DITIs script command is “DropDITI”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.8 “Drop DITIs Command”, 15-14.

Tab. A-20 *Advanced worklist command DropDITI, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	grid	integer	1 - 67	DITI waste location - grid position
3	site	integer	0 - 127	DITI waste location - (site on carrier - 1)
4	airgap	floating point	0 - 100	volume of airgap in µl which is aspirated after dropping the DITIs
5	airgap speed	integer	1 - 1000	speed of airgap aspiration in µl/s
6	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

Example:
DropDITI(240,4,2,10,70,0);

A.15.4.7 Set Diti Position (Worklist: Set_DITI_Counter)

The advanced worklist command which corresponds to the Set Diti Position script command is “Set_DITI_Counter”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.9 “Set DITI Position Command”, 15-15.

Tab. A-21 *Advanced worklist command Set_DITI_Counter, parameters*

Par.	Name	Type	Range	Explanation
1	type	integer	0 - 3	DITI index (see 9.4.5 “Labware Types and DITI Types”, 9-32, DITI Index)
2	grid	string1		DITI rack location - grid position
3	site	string1		DITI rack location - (site on carrier - 1)
4	posInRack	string1		position of next unused DITI in labware

Example:
Set_DITI_Counter(0,"4","1","12");

A.15.4.8 Pick Up DITIs (Worklist: Pick Up_DITI)

The advanced worklist command which corresponds to the Pick Up DITIs script command is “Pick Up_DITIs”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.10 “Pick Up DITIs Command”, 15-16.

Tab. A-22 *Advanced worklist command Pick Up_DITI, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	grid	integer	1 - 67	DITI rack location - grid position
3	site	integer	0 - 127	DITI rack location - (site on carrier - 1)
4	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)
5	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 6 - 8 are included n times, where n = noOfLoopOptions.[a)]
6	loopName	string1		loop name

Tab. A-22 Advanced worklist command Pick Up_DITI, parameters (cont.)

Par.	Name	Type	Range	Explanation
7	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
8	difference	integer		number (“vary by”) which is used for the loop action (parameter 7)
9	type	integer	0 - 3	DITI index (see 9.4.5 “Labware Types and DITI Types”, 9-32, DITI Index)
10	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:
PickUp_DITIs(240,4,0,"0C08 1000000000000",0,0,0);

A.15.4.9 Set DITIs Back (Worklist: Set_DITIs_Back)

The advanced worklist command which corresponds to the Set DITIs Back script command is “Set_DITIs_Back”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.11 “Set DITIs Back Command”, 15-18.

Tab. A-23 Advanced worklist command Set_DITIs_Back, parameters

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	grid	integer	1 - 67	DITI rack location - grid position
3	site	integer	0 - 127	DITI rack location - (site on carrier - 1)
4	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)
5	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 6 - 8 are included n times, where n = noOfLoopOptions.[a)]

***Tab. A-23** Advanced worklist command Set_DITIs_Back, parameters (cont.)*

Par.	Name	Type	Range	Explanation
6	loopName	string1		loop name
7	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
8	difference	integer		number (“vary by”) which is used for the loop action (parameter 7)
9	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:
Set_DITIs_Back(240,4,0,"0C0800I00000000000",0,0);

A.15.4.10 Pickup ZipTip (Worklist: PickUp_ZipTip)

The advanced worklist command which corresponds to the PickUp ZipTip script command is “PickUp_ZipTip”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.12 “Pickup ZipTip Command”, 15-19.

***Tab. A-24** Advanced worklist command PickUp_ZipTip, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	grid	integer	1 - 67	DITI rack location - grid position
3	site	integer	0 - 127	DITI rack location - (site on carrier - 1)
4	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)
5	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 6 - 8 are included n times, where n = noOfLoopOptions. a)
6	loopName	string1		loop name
7	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack

Tab. A-24 Advanced worklist command PickUp_ZipTip, parameters (cont.)

Par.	Name	Type	Range	Explanation
8	difference	integer		number (“vary by”) which is used for the loop action (parameter 7)
9	type	integer	0 - 3	DITI index (see 9.4.5 “Labware Types and DITI Types”, 9-32, DITI Index).
10	airgap	floating point	0 - 100	volume of airgap in µl which is aspirated after dropping the DITI
11	speed	floating point	10 - 100	Specifies the speed of airgap aspiration in µl/s
12	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:
PickUp_ZipTip(240,4,0,"0C080030000000000",0,4,0.000000,70.000000,0);

A.15.4.11 Detect Liquid (Worklist: Detect_Liquid)

The advanced worklist command which corresponds to the Detect Liquid script command is “Detect_Liquid”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.13 “Detect Liquid Command”, 15-20.

Tab. A-25 Advanced worklist command Detect_Liquid, parameters

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	liquidClass	string1		liquid class name
3	grid	integer	1 - 67	labware location - carrier grid position
4	site	integer	0 - 127	labware location - (site on carrier - 1)
5	spacing	integer	1 - ...	tip spacing
6	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)
7	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 8 - 10 are included n times, where n = noOfLoopOptions.

***Tab. A-25** Advanced worklist command Detect_Liquid, parameters (cont.)*

Par.	Name	Type	Range	Explanation
8	loopName	string1		loop name
9	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
10	difference	integer		number (“vary by”) which is used for the loop action (parameter 9)
11	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

Example with no loop options:
Detect_Liquid(15,"Water",15,2,1,"0C08000¨0000000000",0,0);

Example with two loop options:
Detect_Liquid(1,"Water",15,0,1,"0C0810000000000000",2,"columns",0,1,"odd-rows",1,2,0);

A.15.4.12 Activate PMP (Worklist: Activate_PMP)

The advanced worklist command which corresponds to the Activate PMP script command is “Activate_PMP”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.18 “Activate PMP Command”, 15-29.

***Tab. A-26** Advanced worklist command Detect_Liquid, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)

Example:
Activate_PMP(192);

A.15.4.13 Deactivate PMP (Worklist: Deactivate_PMP)

The advanced worklist command which corresponds to the Deactivate PMP script command is “Deactivate_PMP”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.19 “Deactivate PMP Command”, 15-30.

Tab. A-27 Advanced worklist command Detect_Liquid, parameters

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)

Example:
Deactivate_PMP(192);

A.15.4.14 Move LiHa (Worklist: MoveLiha)

The advanced worklist command which corresponds to the Move Liha script command is “MoveLiha”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.21 “Move LiHa Command”, 15-33.

Tab. A-28 Advanced worklist command MoveLiha, parameters

Par.	Name	Type	Range	Explanation
1	tipMask	integer	0 - 255	selected tips, bit-coded (tip1 = 1, tip8 = 128)
2	grid	integer	1 - 67	labware location - carrier grid position
3	site	integer	0 - 127	labware location - (site on carrier - 1)
4	spacing	integer	1 - ...	tip spacing
5	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)
6	zMove	integer	0 - 4	type of movement: 0 = positioning with global z-travel 1 = positioning with local z-travel 2 = x-move 3 = y-move 4 = z-move
7	zTarget	integer	0 - 4	z-position after move: 0 = z-travel 1 = z-dispense 2 = z-start 3 = z-max 4 = global z-travel
8	offset	floating point	-1000 - 1000	offset in mm added to z-position (parameter 7)
9	speed	floating point	0.1 - 400	move speed in mm/s if zMove is 2, 3 or 4
10	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 11 - 13 are included n times, where n = noOfLoopOptions.[a)]

Tab. A-28 Advanced worklist command MoveLiha, parameters (cont.)

Par.	Name	Type	Range	Explanation
11	loopName	string1		loop name
12	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
13	difference	integer		number (“vary by”) which is used for the loop action (parameter 12)
14	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:
MoveLiha(1,15,2,1,"0C08@0000000000000",0,0,0,10,0,0);

A.15.4.15 Waste (Worklist: Waste)

The advanced worklist command which corresponds to the Waste script command is “Waste”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.22 “Waste Command”, 15-35.

Tab. A-29 Advanced worklist command Waste, parameters

Par.	Name	Type	Range	Explanation
1	action	integer	0 - 5	action: 0 = init system 1 = activate waste #1 2 = activate waste #2 3 = activate waste #3 4 = deactivate all wastes 5 = deactivate system

Example:
Waste(1);

A.15.4.16 Active WashStation (Worklist: Active_Wash)

The advanced worklist command which corresponds to the Active Washstation script command is “Active_Wash”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.23 “Active WashStation Command”, 15-36.

Tab. A-30 Advanced worklist command Active_Wash, parameters

Par.	Name	Type	Range	Explanation
1	selection	integer	0 - 1	selection: 0 = Wait until termination of command 1 = Continue with script without waiting for termination
2	time	integer	1 - 999	Time of pump activation in seconds
3	arm	integer	0 - 1	number of the LiHa performing the action: 0 = LiHa 1 1 = LiHa 2

Example:
Active_Wash(0,5,0);

A.15.4.17 Export Data (Worklist: Export)

The advanced worklist command which corresponds to the Export Data script command is “Export”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.26 “Export Data Command”, 15-48.

Tab. A-31 Advanced worklist command Export, parameters

Par.	Name	Type	Range	Explanation
1	exportAll	integer	0 - 1	1 = export all labware items on worktable
2	formats	integer	0 - 63	bit-coded output file format: 1 = lotus 2 = dbase 4 = excel 8 = paradox 16 = quattro 32 = text with delimiters
3	delete	integer	0 - 1	1 = don't export already exported data again later
4	compress	integer	0 - 1	1 = create only one record per well

Tab. A-31 *Advanced worklist command Export, parameters (cont.)*

Par.	Name	Type	Range	Explanation
5	noRacks	integer		Number of labware items for which data should be exported. If non-zero, parameters 6 - 7 are included n times, where n = noRacks.
6	grid	integer	1 - 67	Labware location - carrier grid position
7	site	integer	0 - 127	Labware location - (site on carrier - 1)
8	significantStep	integer	1-99	Significant pipetting step for the Magellan software if a well is pipetted several times.

Example:
Export(0,32,0,0,2,10,0,22,3,1);

A.15.4.18 Start Timer (Worklist: StartTimer)

The advanced worklist command which corresponds to the Start Timer script command is “StartTimer”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.34 “Start Timer Command”, 15-95.

Tab. A-32 *Advanced worklist command StartTimer, parameters*

Par.	Name	Type	Range	Explanation
1	timer	expression	1 - 100	number of timer to re-start

Example:
StartTimer("2");

A.15.4.19 Wait for Timer (Worklist: WaitTimer)

The advanced worklist command which corresponds to the Wait for Timer script command is “WaitTimer”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.35 “Wait for Timer Command”, 15-95.

Tab. A-33 *Advanced worklist command WaitTimer, parameters*

Par.	Name	Type	Range	Explanation
1	timer	expression	1 - 100	timer number
2	timeSpan	expression	0.02 - 86400	duration

Example:
WaitTimer("2","60");

A.15.4.20 Execute Application (Worklist: Execute)

The advanced worklist command which corresponds to the Execute Application script command is “Execute”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.36 “Execute Application Command”, 15-96.

Tab. A-34 *Advanced worklist command Execute, parameters*

Par.	Name	Type	Range	Explanation
1	application	string1		path and name of application to execute
2	options	integer	0 - 7	bit-coded options: 1 = release COM port 2 = wait for termination of application 4 = store return value in variable
3	responseVariable	string1		name of variable to receive the return value
4	scope	integer	0 - 2	scope of responseVariable (see 6.4.6 “Declare Variables”, 6-12): 0 = Run 1 = Instance 2 = Script

Example:

```
Execute("c:\tools\notepad.exe",2,"response2",2);
```

A.15.4.21 Comment (Worklist: Comment)

The advanced worklist command which corresponds to the Comment script command is “Comment”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.37 “Comment Command”, 15-97.

Tab. A-35 *Advanced worklist command Comment, parameters*

Par.	Name	Type	Range	Explanation
1	comment	string1		comment string

Example:

```
Comment("The pipetting starts in the following line");
```

A.15.4.22 User Prompt (Worklist: UserPrompt)

The advanced worklist command which corresponds to the User Prompt script command is “UserPrompt”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.38 “User Prompt Command”, 15-98.

Tab. A-36 *Advanced worklist command UserPrompt, parameters*

Par.	Name	Type	Range	Explanation
1	text	string1		message text
2	sound	integer	0 - 3	sound options: 0 = no sound 1 = beep once 2 = beep three times 3 = beep every 3 seconds
3	closeTime	integer	1 - 9999, -1	time after which the prompt window is automatically closed; -1 = never

Example:
UserPrompt("Please refill the trough",3,60);

A.15.4.23 Set Variable (Worklist: Variable)

The advanced worklist command which corresponds to the Set Variable script command is “Variable”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.41 “Set Variable Command”, 15-101.

Tab. A-37 *Advanced worklist command Variable, parameters*

Par.	Name	Type	Range	Explanation
1	name	string2		name of variable
2	default	expression		value assigned to variable or default value if user query
3	queryFlag	integer	0 - 1	0 = no user query 1 = user query
4	queryString	string1		text shown in user query
5	checkLimits	integer	0 - 1	1 = validate user entry
6	lowerLimit	floating point		smallest allowed value
7	upperLimit	floating point		largest allowed value

Tab. A-37 Advanced worklist command Variable, parameters (cont.)

Par.	Name	Type	Range	Explanation
8	type	integer	0 - 1	type of variable 0 = Numeric 1 = String
9	scope	integer	0 - 2	scope of variable (see 6.4.6 “Declare Variables”, 🗎 6-12): 0 = Run 1 = Instance 2 = Script
10	InitMode	integer	0 - 2	0 = Fixed value 1 = User query 2 = File import
11	QueryAtStart	integer	0 - 1	1 = Prompt for value at start of script

Example:
Variable(volume1,"55",1,"Please specify volume",1,1.000000,80.000000,0,2,1,0);

A.15.4.24 Execute VB Script (Worklist: Execute_VBscript)

The advanced worklist command which corresponds to the Execute VBscript script command is “Execute_VBscript”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.50 “Execute VB Script Command”, 🗎 15-114.

Tab. A-38 Advanced worklist command Execute_VBscript, parameters

Par.	Name	Type	Range	Explanation
1	filename	string1		Path and filename of the defined VB script.
2	action	integer	0 - 2	0 = script waits for end of the VB script 1 = script continues 2 = script waits for a previously started VB script

Example:
Execute_VBscript("c:\tools\Example1.vbs",0);

A.15.4.25 Notification (Worklist: Notification)

The advanced worklist command which corresponds to the Notification script command is “Notification”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.51 “Notification Command”, 🗎 15-116.

Tab. A-39 Advanced worklist command Notification, parameters

Par.	Name	Type	Range	Explanation
1	AttachScreen-ShotFlag	integer	0 - 1	1 = attach screen shot to eMail
2	receiverGroup	string1		name of recipient group. Recipient groups are specified in the Configuration Tool, see 8.3.2.3 “Groups Tab”, 8-15.
3	emailSubject	string1		email subject
4	emailMessage	string1		email message
5	Action	integer	0 - 2	action: 0 = send email now 1 = send email on error 2 = stop sending email on error

Example:
Notification(0,"Operators","System liquid","Please refill container",0);

A.15.4.26 Te-MO Aspirate (Worklist: Aspirate-Multipip)

The advanced worklist command which corresponds to the Te-MO Aspirate script command is “Aspirate-Multipip”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.1 “Te-MO Aspirate Command”, 15-122.

Tab. A-40 Advanced worklist command Aspirate-Multipip, parameters

Par.	Name	Type	Range	Explanation
1	tipMask	integer	1	Number of tips on the Te-MO pipetting head. Only two values are allowed: 255 = 96 tip head 65535 = 384 tip head
2	liquidClass	string1		liquid class name
3	volume	string1		defines the volume for the tips
4	grid	integer	1 - 67	Te-MO location - grid position
5	site	integer	0 - 14	labware location - (Te-MO site - 1) (see Tab. 8-9, 8-104)
6	cycles	integer	1 - ...	number of mixing cycles (only relevant for Te-MO Mix command - pad with 1 for Te-MO Aspirate and Te-MO Dispense)
7	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)

Tab. A-40 Advanced worklist command Aspirate-Multipip, parameters (cont.)

Par.	Name	Type	Range	Explanation
8	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 9 - 11 are included n times, where n = noOfLoopOptions.[a)]
9	loopName	string1		loop name
10	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
11	difference	integer		number (“vary by”) which is used for the loop action (parameter 10)

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:

```
Aspirate-Multipip(255,"384
DMSO","5",22,3,1,"1810
                  o",0);
```

A.15.4.27 Te-MO Dispense (Worklist: Dispense-Multipip)

The advanced worklist command which corresponds to the Te-MO Dispense script command is “Dispense-Multipip”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.2 “Te-MO Dispense Command”, 15-124.

Tab. A-41 Advanced worklist command Dispense-Multipip, parameters

Par.	Name	Type	Range	Explanation
1	tipMask	integer	1	Number of tips on the Te-MO pipetting head. Only two values are allowed: 255 = 96 tip head 65535 = 384 tip head
2	liquidClass	string1		liquid class name
3	volume	string1		defines the volume for the tips
4	grid	integer	1 - 67	Te-MO location - grid position
5	site	integer	0 - 14	labware location - (Te-MO site - 1) (see Tab. 8-9, 8-104)
6	cycles	integer	1 - ...	number of mixing cycles (only relevant for Te-MO Mix command - pad with 1 for Te-MO Aspirate and Te-MO Dispense)
7	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)

Tab. A-41 *Advanced worklist command Dispense-Multipip, parameters (cont.)*

Par.	Name	Type	Range	Explanation
8	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 9 - 11 are included n times, where n = noOfLoopOptions.[a)]
9	loopName	string1		loop name
10	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
11	difference	integer		number (“vary by”) which is used for the loop action (parameter 10)

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:

```
Dispense-Multipip(255,"384
DMSO","5",22,3,1,"1810
          o",0);
```

A.15.4.28 Te-MO Mix (Worklist: Mix-Multipip)

The advanced worklist command which corresponds to the Te-MO Mix script command is “Mix-Multipip”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.3 “Te-MO Mix Command”, 15-125.

Tab. A-42 *Advanced worklist command Mix-Multipip, parameters*

Par.	Name	Type	Range	Explanation
1	tipMask	integer	1	Number of tips on the Te-MO pipetting head. Only two values are allowed: 255 = 96 tip head 65535 = 384 tip head
2	liquidClass	string1		liquid class name
3	volume	string1		defines the volume for the tips
4	grid	integer	1 - 67	Te-MO location - grid position
5	site	integer	0 - 14	labware location - (Te-MO site - 1) (see Tab. 8-9, 8-104)
6	cycles	integer	1 - ...	number of mixing cycles
7	wellSelection	string1		bit-coded well selection (see A.15.3 “Well Selection”, A-120)

Tab. A-42 Advanced worklist command Mix-Multipip, parameters (cont.)

Par.	Name	Type	Range	Explanation
8	noOfLoopOptions	integer	0 - 7	number of loop options required. If non-zero, parameters 9 - 11 are included n times, where n = noOfLoopOptions.[a)]
9	loopName	string1		loop name
10	action	integer	0 - 3	loop action: 0 = vary the column 1 = vary the row 2 = vary the well 3 = vary the rack
11	difference	integer		number (“vary by”) which is used for the loop action (parameter 10)

a) See A.15.4.11, A-131 for an example which uses loop options.

Example:

```
Mix-Multipip(255,"384 DMSO","5",22,3,4,"1810 o",0);
```

A.15.4.29 Te-MO Wash (Worklist: Wash-Multipip)

The advanced worklist command which corresponds to the Te-MO Wash script command is “Wash-Multipip”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.4 “Te-MO Wash Command”, 15-127.

Tab. A-43 Advanced worklist command Wash-Multipip, parameters

Par.	Name	Type	Range	Explanation
1	cleanerSteps	integer	1 - 5	number of cleaner steps required. Parameters 2 - 12 are repeated n times, where n = (cleanerSteps + 1)[a)]
2	washGrid	integer	1 - 67	Te-MO location - grid position
3	washSite	integer	0 - 14	WRC location - (Te-MO site - 1) (see Tab. 8-9, 8-104)
4	liquidClass	string1		Liquid class to use for step
5	Volume	string1		Wash liquid volume for cleaner step (ignored for empty tips step: pad with 0)
6	Soaktime	string1	0 - 200	Soak time defined for step
7	Cycles	string1		How many aspirate/dispense cycles for this cleaner step (ignored for empty tips step: pad with 0)

Tab. A-43 *Advanced worklist command Wash-Multipip, parameters (cont.)*

Par.	Name	Type	Range	Explanation
8	Washliquid	string1		Wash liquid to use in step (container 1 or container 2)
9	Flowthrough	string1	1 - 100	WRC flow rate for step (%)
10	Change	string1		Wash liquid change for cleaner step (ignored for empty tips step: pad with 0)
11	Preflush	string1	0 - 1000	Preflush time for step, seconds
12	Postflush	string1	0 - 1000	Postflush time for step, seconds

a) The minimum (cleanerSteps=1) is one Empty Tips step followed by one Cleaner step. This requires two sets of the parameters 2 - 12.

Example with one Empty Tips step and two Cleaner steps:
Wash-Multipip(2,22,9,"384 DMSO",5,1,1,1,40,0,0,0,22,9,"384 DMSO",5,5,1,1,50,0,5,0,22,9,"384 DMSO",5,1,1,1,50,0,0,0);

A.15.4.30 Te-MO 384 Wash Tip Head (Worklist: Wash-TeMO-384)

The advanced worklist command which corresponds to the Te-MO 384 Wash Tip Head script command is “Wash_Multipip_384”. This advanced worklist command can only be used in Freedom EVOware Standard.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.5 “Te-MO 384 Wash Tip Head Command”, 15-130.

Tab. A-44 *Advanced worklist command Wash_Multipip_384, parameters*

Par.	Name	Type	Range	Explanation
1	flushTime	floating point	0.1 - 50	Flush time in wash block
2	flushTimeout	floating point	0.1	Always specify 0.1
3	washTime	floating point	0.1 - 50	Wash time in wash block
4	washTimeout	floating point	30	Always specify 30
5	washStationID	integer	0 -	grid position and site of the wash bloc, coded as follows: washStationID = grid * 256 + site
6	quickFlush	integer	0 - 1	1 = Use quick flush
7	plungerWash	integer		1 = Tip washing with plunger moves
8	washCyles	string1		Wash cycles
9	washVolume	string1	1 - 100	Wash volume
10	washSpeed	string1		Wash speed
12	postflush	integer	0 - 1	1 = Flush tips after plunger moves

Example:

Wash-TeMO-384(8,0.1,5,30,5640,0,1,3,20,10,1);

A.15.4.31 Te-MO Get DITIs (Worklist: Multipip_GetDITI)

The advanced worklist command which corresponds to the Te-MO Get DITIs script command is “Multipip_GetDITI”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.6 “Te-MO Get DITIs Command”, 15-132.

***Tab. A-45** Advanced worklist command Multipip_GetDITI, parameters*

Par.	Name	Type	Range	Explanation
1	grid	integer	1 - 67	Te-MO location - grid position
2	site	integer	0 - 14	DITI rack location - (Te-MO site - 1) (see Tab. 8-9, 8-104)
3	airgap	floating point		Blowout airgap

Example:
Multipip_GetDITI(22,7,2.000000);

A.15.4.32 Te-MO Drop DITIs (Worklist: Multipip_DropDITI)

The advanced worklist command which corresponds to the Te-MO Drop DITIs script command is “Multipip_DropDITI”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.7 “Te-MO Drop DITIs Command”, 15-133.

***Tab. A-46** Advanced worklist command Multipip_DropDITI, parameters*

Par.	Name	Type	Range	Explanation
1	grid	integer	1 - 67	Te-MO location - grid position
2	site	integer	0 - 14	DITI rack final location - (Te-MO site - 1) (see Tab. 8-9, 8-104)
3	action	integer	0 - 1	action: 0 = back to source 1 = back to a different position
4	discard	integer	0 - 1	discard: 0 = Do not discard DITI rack 1 = Discard DITI rack into waste

Example:
Multipip_DropDITI(22,7,1,0);

A.15.4.33 Te-MO Get Tipblock (Worklist: Multipip_GetBlock)

The advanced worklist command which corresponds to the Te-MO Get Tipblock script command is “Multipip_GetBlock”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.8 “Te-MO Get Tip Block Command”, 15-134.

***Tab. A-47** Advanced worklist command Multipip_GetBlock, parameters*

Par.	Name	Type	Range	Explanation
1	grid	integer	1 - 67	Te-MO location - grid position
2	site	integer	0 -14	tip block location - (Te-MO site - 1) (see Tab. 8-9, 8-104)
3	airgap	floating point		Blowout airgap

Example:

```
Multipip_GetBlock(22,0,2.000000);
```

A.15.4.34 Te-MO Drop Tip Block (Worklist: Multipip_DropBlock)

The advanced worklist command which corresponds to the Te-MO Drop Tip Block script command is “Multipip_DropBlock”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.9 “Te-MO Drop Tip Block Command”, 15-135.

***Tab. A-48** Advanced worklist command Multipip_DropBlock, parameters*

Par.	Name	Type	Range	Explanation
1	grid	integer	1 - 67	Te-MO location - grid position
2	site	integer	0 - 14	tip block final location - (Te-MO site - 1) (see Tab. 8-9, 8-104)
3	action	integer	0 - 1	action: 0 = back to source 1 = back to a different position

Example:

```
Multipip_DropBlock(22,0,1);
```

A.15.4.35 Te-MO Refill Trough (Worklist: TeMO_Refill)

The advanced worklist command which corresponds to the Te-MO Refill Trough script command is “TeMO_Refill”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.10 “Te-MO Refill Trough Command”, 15-135.

Tab. A-49 Advanced worklist command TeMO_Refill, parameters

Par.	Name	Type	Range	Explanation
1	channel	integer	0 - 3	required refill channel (required liquid container)
2	lowLevel	integer	0 - 100	min. liquid level in trough (%)
3	highLevel	integer	0 - 100	max. liquid level in trough (%)
4	grid	integer	1 - 14	Te-MO location - grid position
5	site	integer	0 - 14	trough location - (Te-MO site - 1) (see Tab. 8-9, 8-104)

Example:
TeMO_Refill(0,5,95,22,5);

A.15.4.36 Te-MO Relative Movements (Worklist: TeMO_Relative)

The advanced worklist command which corresponds to the Te-MO Relative Movements script command is “TeMO_Relative”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.56.11 “Te-MO Relative Movements Command”, 15-136.

Tab. A-50 Advanced worklist command TeMO_Relative, parameters

Par.	Name	Type	Range	Explanation
1	action	integer	0 - 2	action: 0 = set row offset 1 = set column offset 2 = switch off offset
2	columnOffset	expression	0 - 47	required column offset
3	rowOffset	expression	0 - 31	required row offset

Example:
TeMO_Relative(0,"","2");

A.15.4.37 Move RoMa (Worklist: RoMa)

The advanced worklist command which corresponds to the Move RoMa script command is “RoMa”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.57 “Move RoMa Command”, 15-140.

Tab. A-51 *Advanced worklist command RoMa, parameters*

Par.	Name	Type	Range	Explanation
1	action	integer	0 - 3	action: 0 = open gripper 1 = close gripper 2 = move to home position 3 = move relative to current position
2	distance	floating point	55 - 140	gripper distance in mm for opening or closing
3	force	integer	0 - 249	force when closing gripper
4	xOffset	floating point	-400 - 400	x-distance for relative move in mm
5	yOffset	floating point	-400 - 400	y-distance for relative move in mm
6	zOffset	floating point	-400 - 400	z-distance for relative move in mm
7	xyzSpeed	floating point	0.1 - 400	speed in mm/s
8	xyzMax	integer	0 - 1	0 = use xyzSpeed 1 = use maximum speed
9	romaNo	integer	0 - 1	number of the RoMa performing the action: 0 = RoMa 1 1 = RoMa 2

Example:
RoMa(3,80,75,50,20,20,150,0,0);

A.15.4.38 RoMa Vector (Worklist: Vector)

The advanced worklist command which corresponds to the RoMa Vector script command is “Vector”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.58 “RoMa Vector Command”, 15-141.

Tab. A-52 *Advanced worklist command Vector, parameters*

Par.	Name	Type	Range	Explanation
1	vector	string1		name of RoMa Vector (as in Configuration)
2	grid	expression	1 - 67	labware location - carrier grid position
3	site	expression	0 - 127	labware location - (site on carrier - 1)
4	direction	integer	0 - 1	0 = from safe to end position 1 = from end to safe position

Tab. A-52 Advanced worklist command Vector, parameters (cont.)

Par.	Name	Type	Range	Explanation
5	back	integer	0 - 1	1 = and back
6	beginAction	integer	0 - 2	gripper action at safe position: 0 = open 1 = close 2 = do not move
7	endAction	integer	0 - 2	gripper action at end position: 0 = open 1 = close 2 = do not move
8	speed	integer	0 - 1	speed: 0 = maximum speed 1 = slow speed (as defined in RoMa vector)
9	romaNo	integer	0 - 1	number of the RoMa performing the action: 0 = RoMa 1 1 = RoMa 2

Example:
Vector("MP 3Pos_Narrow_1","15","1",0,0,2,2,0,0);

A.15.4.39 Transfer Labware (Worklist: Transfer_Rack)

The advanced worklist command which corresponds to the Transfer Labware script command is “Transfer_Rack”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.59 “Transfer Labware Command”, 15-143.

Tab. A-53 Advanced worklist command Transfer_Rack, parameters

Par.	Name	Type	Range	Explanation
1	gridSource	expression	1 - 67	labware location - carrier grid position, source
2	gridDestination	expression	0 - 67	labware location - carrier grid position, destination
3	backHome	integer	0 - 1	1 = move back to home when finished
4	lidHandling	integer	0 - 1	0 = no lid handling 1= lid handling
5	speed	integer	0 - 1	speed: 0 = maximum speed 1 = slow speed (as defined in RoMa vector)

Tab. A-53 *Advanced worklist command Transfer_Rack, parameters (cont.)*

Par.	Name	Type	Range	Explanation
6	romaNo	integer	0 - 1	number of the RoMa performing the action: 0 = RoMa 1 1 = RoMa 2
7	cover			0 = cover at source 1 = uncover at destination
8	GridLid	expression	1 - 67	lid location - carrier grid position
9	rackType			labware type (as in the Freedom EVOware configuration)
10	vectorName	string1		name of RoMa vector to use (as in the Freedom EVOware configuration), choose from one of the following: Narrow[a)] DriveIN_Narrow Wide DriveIN_Wide
11	unused	string1		pad with 0
12	unused	string1		pad with 0
13	carrierName-Source			carrier name, source
14	carrierNameLid			carrier name, lid
15	carrierNameDes-tination			carrier name, destination
16	siteSource	expression	0 - 127	labware location - (site on carrier - 1), source
17	siteLid	expression	0 - 127	lid location - (site on carrier - 1)
18	siteDestination	expression	0 - 127	labware location - (site on carrier - 1), destination

a) In the Freedom EVOware GUI, Narrow = Move Narrow, DriveIN_Narrow = Approach Narrow etc. See 9.6.1 “Using RoMa Vectors”, 9-58.

Example:
Transfer_Rack("15","15",0,1,0,0,0,"15","96 Well Microplate","Narrow","","","MP 3Pos","MP 3Pos","MP 3Pos","3","2","1");

A.15.4.40 Move PnP (Worklist: PnP)

The advanced worklist command which corresponds to the Move PnP script command is “PnP”. This advanced worklist command can only be used in Freedom EVOware Standard.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.60 “Move PnP Command”, 15-145.

Tab. A-54 Advanced worklist command PnP, parameters

Par.	Name	Type	Range	Explanation
1	action	integer	0 - 3	action: 0 = open gripper 1 = close gripper 2 = move to home position 3 = move relative to current position
2	distance	floating point	70 - 140	gripper distance in mm for opening or closing
3	force	integer	0 - 249	force when closing gripper
4	xOffset	floating point	-400 - 400	x-distance for relative move in mm
5	yOffset	floating point	-400 - 400	y-distance for relative move in mm
6	zOffset	floating point	-400 - 400	z-distance for relative move in mm
7	xyzSpeed	floating point	0.1 - 400	speed in mm/s
8	xyzMax	integer	0 - 1	0 = use xyzSpeed 1 = use maximum speed
9	pnpNo	integer	0 - 1	number of the PnP performing the action: 0 = PnP 1 1 = PnP 2

Example:
PnP(3,13,75,50,20,20,150,1,0);

A.15.4.41 PnP Vector (Worklist: PnP_Vector)

The advanced worklist command which corresponds to the PnP Vector script command is “PnP_Vector”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.61 “PnP Vector Command”, 15-146.

Tab. A-55 Advanced worklist command PnP_Vector, parameters

Par.	Name	Type	Range	Explanation
1	vector	string1		name of PnP Vector (as in Configuration)
2	grid	expression	1 - 67	labware location - carrier grid position
3	site	expression	0 - 127	labware location - (site on carrier - 1)
4	position	integer	1-96	tube position in tube rack

Tab. A-55 Advanced worklist command PnP_Vector, parameters (cont.)

Par.	Name	Type	Range	Explanation
5	direction	integer	0 - 1	0 = from safe to end position 1 = from end to safe position
6	back	integer	0 - 1	1 = and back
7	beginAction	integer	0 - 2	gripper action at safe position: 0 = open 1 = close 2 = do not move
8	endAction	integer	0 - 2	gripper action at end position: 0 = open 1 = close 2 = do not move
9	speed	integer	0 - 1	speed: 0 = maximum speed 1 = slow speed (as defined for RoMa vector)
10	pnpNo	integer	0 - 1	number of the PnP performing the action: 0 = PnP 1 1 = PnP 2

Example:
PnP_Vector("Tube 16*100mm 16 Pos_1","10","1","5",0,0,2,1,0,0);

A.15.4.42 Transfer Tube (Worklist: Transfer_Tube)

The advanced worklist command which corresponds to the Transfer Tube script command is “Transfer_Tube”. This advanced worklist command can only be used in Freedom EVOware Standard.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.62 “Transfer Tube Command”, 15-148.

Tab. A-56 Advanced worklist command Transfer_Tube, parameters

Par.	Name	Type	Range	Explanation
1	gridSource	expression	1 - 67	labware location - carrier grid position, source
2	gridDestination	expression	0 - 67	labware location - carrier grid position, destination
3	backHome	integer	0 - 1	1 = move back to home when finished
4	speed	integer	0 - 1	speed: 0 = maximum speed 1 = slow speed (as defined in PnP vector)

Tab. A-56 Advanced worklist command Transfer_Tube, parameters (cont.)

Par.	Name	Type	Range	Explanation
5	pnpNo	integer	0 - 1	number of the PnP performing the action: 0 = PnP 1 1 = PnP 2
6	positionSource	integer	1 - max. number of tubes	tube position in tube rack, source
7	positionDestina-tion	integer	1 - max. number of tubes	tube position in tube rack, destination
8	rackType	string1		labware type (as in the Freedom EVOware configuration)
9	vectorSource	string1		unused, pad with 0.
10	vectorDestination	string1		unused, pad with 0.
11	siteSource	expression	0 - 127	labware location - (site on carrier - 1), source
12	siteDestination	expression	0 - 127	labware location - (site on carrier - 1), destination
13	WipeOffMove-ment	integer	0 - 10	steps max 10 mm

Example:
Transfer_Tube("10","13",0,0,0,"1","1","","","","1","1",0);

A.15.4.43 PosID (Worklist: PosID)

The advanced worklist command which corresponds to the PosID script command is “PosID”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.63 “PosID Command”, 15-150.

Tab. A-57 Advanced worklist command PosID, parameters

Par.	Name	Type	Range	Explanation
1	worktableSpeed	integer	30 - 300	speed with which the carrier or tube rack barcodes should be scanned
2	numberLabware	integer		total number of labware items to scan. Parameters 3 - 5 are included n times, where n = numberLabware
3	grid	integer	1 - 67	labware location - carrier grid position
4	site	integer	0 - 127	labware location - (site on carrier - 1)

***Tab. A-57** Advanced worklist command PosID, parameters (cont.)*

Par.	Name	Type	Range	Explanation
5	scanSpeed	integer	30 - 400	speed with which the labware barcode should be scanned
6	noBarcodeTypes	integer	1 - 23	the number of different barcode types to be accepted. Parameters 7 - 10 are included n times, where n = noBarcode-Types
7	barcodeType	integer	1 - 23	barcode type: 1 = 2 of 5 Interleaved 2 = Codabar 3 = Code128 4 = Code39 5 = EAN-13 6 = EAN-13 with 2 Supplement 7 = EAN-13 with 5 Supplement 8 = EAN-8 9 = EAN-8 with 2 Supplement 10 = EAN-8 with 5 Supplement 11 = UPC-A 12 = UPC-A with 2 Supplement 13 = UPC-A with 5 Supplement 14 = UPC-E 15 = UPC-E with 2 Supplement 16 = UPC-E with 5 Supplement 17 = C.I.P. 18 = Code32 19 = Code39 Full ASCII 20 = Code93 21 = Code93 Full ASCII 22 = MSI 23 = EAN-128
8	barcodeLength	integer	0 - 30	0 = do not check the barcode length 1 to 30 = required barcode length Refer to the published barcode specifications for information on the allowed length for each barcode type. Also see C.3 “Recommendations when using barcodes”, C-4.
9	checkDigitMode	integer		checksum checking mode: [a] 0 = do not evaluate the checksum 1 = evaluate and transmit 2 = evaluate but don’t transmit
10	startStopMode	integer		handling of start/stop codes: [a] 0 = start/stop code is not required 1 = required and transmit 2 = required but don’t transmit
11	options	integer	0 - 127	bit-coded options as follows: 1 = No prompt for scan errors 2 = Write file with scan results 4 = Ignore duplicate barcodes

a) See 15.63.1 “PosID Command (Barcode Types Tab)”, 15-153 for more details.

Example with two labware items and two barcode types:
PosID(200,2,10,0,250,15,1,400,2,3,18,0,0,1,12,1,0,1);

A.15.4.44 Waterbath Control Command (Worklist: Waterbath)

The advanced worklist command which corresponds to the Waterbath Control Command script command is “Waterbath”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.64 “Waterbath Control Command”, 15-154.

***Tab. A-58** Advanced worklist command Waterbath, parameters*

Par.	Name	Type	Range	Explanation
1	action	integer	0 - 2	action: 0 = set temperature 1 = switch bath to standby 2 = restart bath
2	bathNumber	integer	0 - 3	waterbath number
3	temperature	floating point	- 100 - 100	bath temperature

Example:
Waterbath(0,0,32);

A.15.4.45 Balance Command (Worklist: Balance)

The advanced worklist command which corresponds to the Balance script command is “Balance”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.65 “Balance Command”, 15-155.

***Tab. A-59** Advanced worklist command Balance, parameters*

Par.	Name	Type	Range	Explanation
1	action	integer	0 - 1	action: 0 = tare balance 1 = measure weight
2	variable	string2		variable to use for measured weight
3	scope	integer	0 - 2	scope of variable (see 6.4.6 “Declare Variables”, 6-12): 0 = Run 1 = Instance 2 = Script
4	stabilization	integer	0 - 1	0 = do not wait for stabilization 1 = wait for stabilization

Example:
Balance(1,weight1,2,1);

A.15.4.46 Balance Send Command Command (Worklist: Balance_Send)

The advanced worklist command which corresponds to the Balance Send Command script command is “Balance_Send”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.66 “Balance Send Command Command”, 15-157.

Tab. A-60 *Advanced worklist command Balance_Send, parameters*

Par.	Name	Type	Range	Explanation
1	commandstring	string2		firmware command
2	termination	integer	0 - 1	action: 0 = do not wait for termination 1 = wait for termination of command
3	response	integer	0 - 1	response: 0 = do not store response in variable 1 = store response in variable
4	response_var	string2		variable to use for response
5	error	integer	0 - 1	error: 0 = do not store error code in variable 1 = store error code in variable
6	error_var	string2		variable to use for error code
9	scope_resp	integer	0 - 2	scope of response variable (see 6.4.6 “Declare Variables”, 6-12): 0 = Run 1 = Instance 2 = Script
9	scope_error	integer	0 - 2	scope of error variable (see 6.4.6 “Declare Variables”, 6-12): 0 = Run 1 = Instance 2 = Script

Example:
Balance_Send(RP2,1,1,response1,1,error1,2,2);

A.15.4.47 Send Command (Worklist: Command)

The advanced worklist command which corresponds to the Send Command script command is “Command”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 15.67 “Send Command Command”, 15-158.

Tab. A-61 Advanced worklist command Command, parameters

Par.	Name	Type	Range	Explanation
1	command	expression		firmware command
2	options	integer	0 - 7	bit-coded options: 1 = wait for termination of command 2 = store error code in variable 4 = store answer in variable
3	parameter	integer	1 - 16	number of the parameter in the response which is stored in the variable “response”
4	response	string2		variable for the response
5	error	string2		variable for the error code
6	errorVarScope	integer	0 - 2	scope of error variable (see 6.4.6 “Declare Variables”, 🗎 6-12): 0 = Run 1 = Instance 2 = Script
7	responseVar-Scope	integer	0 - 2	scope of response variable (see 6.4.6 “Declare Variables”, 🗎 6-12): 0 = Run 1 = Instance 2 = Script
8	type	integer	0 - 1	type of response variable: 0 = Numeric 1 = String

Example:
Command("A1RPZ0",7,1,response2,error2,2,2,0);

A.15.5 Advanced Worklist Commands for the Carousel

The following describes the most important advanced worklist commands for the Carousel.

A.15.5.1 ReadAllBarcodes (Worklist: Carousel_ReadAllBarcodes)

The advanced worklist command which corresponds to the Carousel-ReadAllBarcodes device command is “Carousel_ReadAllBarcodes”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.3.5 “Carousel - ReadAllBarcodes command”, 🗎 16-5

Tab. A-62 *Advanced worklist command Carousel_ReadAllBarcodes, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Carousel","Carousel_ReadAllBarcodes","","0","");

A.15.5.2 InitCarousel (Worklist: Carousel_InitCarousel)

The advanced worklist command which corresponds to the Carousel-InitCarousel device command is “Carousel_InitCarousel”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.3.6 “Carousel - InitCarousel Command”, 16-5.

Tab. A-63 *Advanced worklist command Carousel_InitCarousel, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Carousel","Carousel_InitCarousel","","0","");

A.15.5.3 ReturnPlate (Worklist: Carousel_ReturnPlate)

The advanced worklist command which corresponds to the Carousel-ReturnPlate device command is “Carousel_ReturnPlate”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.3.3 “Carousel - ReturnPlate Command”, 16-3.

Tab. A-64 Advanced worklist command Carousel_ReturnPlate, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		cartridge (tower) number, labware position in tower
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Carousel","Carousel_ReturnPlate","2,25","0","");

A.15.5.4 PresentPlate (Worklist: Carousel_PresentPlate)

The advanced worklist command which corresponds to the Carousel-PresentPlate device command is “Carousel_PresentPlate”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.3.1 “Carousel - PresentPlate Command”, 16-2.

Tab. A-65 Advanced worklist command Carousel_PresentPlate, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		cartridge (tower) number, labware position in tower
4	needs_allwd_lw	expression		specify 1 (needs a specific labware type)
5	allowed_labware	expression		required labware type

Example:
FACTS("Carousel","Carousel_PresentPlate","2,5","1","96_Well_Microplate");

A.15.5.5 MoveToCartridge (Worklist: Carousel_MoveToCartridge)

The advanced worklist command which corresponds to the Carousel-MoveToCartridge device command is “Carousel_ReadAllBarcodes”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.3.7 “Carousel - MoveToCartridge Command”, 16-5.

Tab. A-66 *Advanced worklist command Carousel_MoveToCartridge, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		cartridge (tower) number
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Carousel","Carousel_MoveToCartridge","2","0","");

A.15.5.6 EndAccess (Worklist: Carousel_EndAccess)

The advanced worklist command which corresponds to the Carousel-EndAccess device command is “Carousel_EndAccess”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.3.9 “Carousel - ReadPlatesInCartridge Command”, 16-6.

Tab. A-67 *Advanced worklist command Carousel_EndAccess, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Carousel","Carousel_EndAccess","","0","");

A.15.5.7 ReadPlatesInCartridge (Worklist: Carousel_ReadPlatesInCartridge)

The advanced worklist command which corresponds to the Carousel-ReadAllBarcodes device command is “Carousel_ReadAllBarcodes”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.3.9 “Carousel - ReadPlatesInCartridge Command”, 16-6.

Tab. A-68 Advanced worklist command Carousel_ReadPlatesInCartridge, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		cartridge (tower) number
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Carousel","Carousel_ReadPlatesInCartridge","2","0","");

A.15.5.8 PresentPlateByBarcode (Worklist: Carousel_PresentPlateByBarcode)

The advanced worklist command which corresponds to the Carousel-PresentPlateByBarcode device command is “Carousel_ReadAllBarcodes”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.3.10 “Carousel - PresentPlateByBarcode Command”, 16-7.

Tab. A-69 Advanced worklist command Carousel_PresentPlateByBarcode, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		barcode line number, name of barcode file
4	needs_allwd_lw	expression		specify 1 (needs a specific labware type)
5	allowed_labware	expression		required labware type

Example:
FACTS("Carousel","Carousel_PresentPlateByBarcode","2,C:\TEMP\BARCODES.TXT","1","96_Well_Microplate");

A.15.5.9 ReturnPlateByBarcode (Worklist: Carousel_ReturnPlateByBarcode)

The advanced worklist command which corresponds to the Carousel-ReturnPlateByBarcode device command is “Carousel_ReturnPlateByBarcode”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.3.4 “Carousel - ReturnPlateByBarcode Command”, 16-4.

***Tab. A-70** Advanced worklist command Carousel_ReturnPlateByBarcode, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Carousel","Carousel_ReturnPlateByBarcode","","0","");

A.15.6 Advanced Worklist Commands for the Hettich Centrifuge

The following describes the most important advanced worklist commands for the Hettich Centrifuge.

A.15.6.1 Init (Worklist: Centrifuge_Init)

The advanced worklist command which corresponds to the Centrifuge-Init device command is “Centrifuge_Init”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.1 “Hettich Centrifuge - Init Command”, 16-16.

***Tab. A-71** Advanced worklist command Centrifuge_Init, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Centrifuge","Centrifuge_Init","","0","");

A.15.6.2 Open (Worklist: Centrifuge_Open)

The advanced worklist command which corresponds to the Centrifuge-Open device command is “Centrifuge_Open”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.2 “Hettich Centrifuge - Open Command”, 16-17.

***Tab. A-72** Advanced worklist command Centrifuge_Open, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Centrifuge","Centrifuge_Open","","0","");

A.15.6.3 Close (Worklist: Centrifuge_Close)

The advanced worklist command which corresponds to the Centrifuge-Close device command is “Centrifuge_Close”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.3 “Hettich Centrifuge - Close Command”, 16-17.

***Tab. A-73** Advanced worklist command Centrifuge_Close, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Centrifuge","Centrifuge_Close","","0","");

A.15.6.4 Execute1 (Worklist: Centrifuge_Execute1)

The advanced worklist command which corresponds to the Centrifuge-Execute1 device command is “Centrifuge_Execute1”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.4 “Hettich Centrifuge - ExecuteN Command”, 16-17.

Tab. A-74 *Advanced worklist command Centrifuge_Execute1, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		rpm,duration,start ramp, stop ramp, temperature
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Centrifuge","Centrifuge_Execute1","2000,600,9,8,20","0","");

A.15.6.5 MoveToPos (Worklist: Centrifuge_MoveToPos)

The advanced worklist command which corresponds to the Centrifuge-MoveToPos device command is “Centrifuge_MoveToPos”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.5 “Hettich Centrifuge - MoveToPos Command”, 16-18.

Tab. A-75 *Advanced worklist command Centrifuge_MoveToPos, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	position	expression		rotor position to move to
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Centrifuge","Centrifuge_MoveToPos","2","0","");

A.15.7 Advanced Worklist Commands for the Magellan Option

The following describes the most important advanced worklist commands for the Tecan Magellan software option.

A.15.7.1 ExcitationOut (Worklist: Magellan_Excitation_Out)

The advanced worklist command which corresponds to the Magellan-ExcitationOut device command is “Magellan_Excitation_Out”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.1 “Hettich Centrifuge - Init Command”, 16-16.

Tab. A-76 *Advanced worklist command Magellan_Excitation_Out, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Magellan","Magellan_Excitation_Out","","0","");

A.15.7.2 EmissionOut (Worklist: Magellan_Emission_Out)

The advanced worklist command which corresponds to the Magellan-EmissionOut device command is “Magellan_Emission_Out”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.2 “Hettich Centrifuge - Open Command”, 16-17.

Tab. A-77 *Advanced worklist command Magellan_Emission_Out, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Magellan","Magellan_Emission_Out","","0","");

A.15.7.3 Open (Worklist: Magellan_Open")

The advanced worklist command which corresponds to the Magellan-Open device command is “Magellan_Open”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.3 “Hettich Centrifuge - Close Command”, 16-17.

Tab. A-78 *Advanced worklist command Magellan_Open, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Magellan","Magellan_Open","","0","");

A.15.7.4 Execute1 (Worklist: Magellan_Close)

The advanced worklist command which corresponds to the Magellan-Close device command is “Magellan_Close”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.4 “Hettich Centrifuge - ExecuteN Command”, 16-17.

Tab. A-79 *Advanced worklist command Magellan_Close, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		rpm,duration,start ramp, stop ramp, temperature
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Magellan","Magellan_Close","","0","");

A.15.7.5 Measure (Worklist: Magellan_Measure)

The advanced worklist command which corresponds to the Magellan-Measure device command is “Magellan_Measure”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.5.5 “Hettich Centrifuge - MoveToPos Command”, 16-18.

Tab. A-80 Advanced worklist command Magellan_Measure, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		path and name of output file, name of method file, import_flag import_flag: 0 = do not import sample ID list 1 = import sample ID list
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Magellan","Magellan_Measure","C:\Documents and Settings\All Users\Documents\Tecan\Magellan\wsp\<ID>.wsp,HIV-ELISA.mth,0","0","");

A.15.8 Advanced Worklist Commands for the PosID-3 Barcode Scanner

The following describes the advanced worklist commands for the PosID-3 barcode scanner.

A.15.8.1 Initialize (Worklist: PosID3_Init)

The advanced worklist command which corresponds to the PosID3-Initialize device command is “PosID3_Init”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.20.1 “PosID-3 - Initialize Command”, 16-70.

Tab. A-81 Advanced worklist command PosID3_Init, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("PosID3","PosID3_Init","","0","");

A.15.8.2 Scan (Worklist: PosID3_Scan)

The advanced worklist command which corresponds to thePosID3-Scan device command is “PosID3_Scan”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.20.2 “PosID-3 - Scan Command”, 16-70.

Tab. A-82 *Advanced worklist command PosID3_Scan, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		see Tab. A-83, A-168.
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

The execution parameters of this command are as follows:

Tab. A-83 *Advanced worklist command PosID3_Scan, execution parameters*

Par.	Name	Type	Range	Explanation
1	USER_ ERRORPROMPT	string1		This label indicates the start of the user_errorprompt section.
2	promptForScan-Errors	string1		True = Prompt if there are scan errors False = Do not prompt if there are scan errors
3	promptForNon-ExistingCarrier	string1		True = Prompt if carrier is missing False = Do not prompt if carrier is missing
4	SCANRESULT_ FILE	string1		This label indicates the start of the scanresult_file section
5	writeScanResult-File	string1		True = Write scan.csv file False = Do not write scan.csv file
6	OVERWRITE_ BC	string1		This label indicates the start of the overwrite_bc section.
7	overwriteOldBCs	string1		True = Overwrite old barcodes False = Do not overwrite old barcodes
8	CARRIER_DEF	string1		This label indicates the start of the carrier definition section. This section (parameters 8 - 23) is repeated n times, where n is the number of carriers to be scanned. Each carrier definition section also contains one or more labware definition sections.

Tab. A-83 *Advanced worklist command PosID3_Scan, execution parameters (cont.)*

Par.	Name	Type	Range	Explanation
9	carrierID	string1		carrier code (first three digits of the carrier barcode, as defined in the Edit Carrier dialog box)
10	carrierSerialNumber	string1		not relevant (specify an empty string)
11	scannedBarcod	string1		not relevant (specify an empty string)
12	carrierType	string1		configuration name of the carrier
13	carrierGrid	string1		carrier grid position
14	carrierNoOfSites	string1		total number of labware sites on carrier (specify 1 for strip racks)
15	LABWARE_DEF	string1		This label indicates the start of the labware definition section. This section (parameters 15 - 23) is repeated n times, where n is the number of labware sites to be scanned on the carrier.
16	labwareLabel	string1		labware label, as shown on the Freedom EVOware worktable
17	labwareAlias	string1		labware alias (only for labware generated by Labware Generator), e.g. "GeneratedLabware{001}
18	labwareType	string1		configuration name of the labware
19	labwareSite	string1		labware location - (site on carrier - 1)
20	labwareNumberOfTubes	string1		placeholder for number of tubes which were scanned (specify 0 in the advanced worklist command)
21	labwareBarcode	string1		not relevant (specify an empty string)
22	labwareScan_err	string1		not relevant (specify an empty string)
23	LabwarePipe_err	string1		not relevant (specify “None” or an empty string)
24	BARCODETYPE_DEF	string1		This label indicates the start of the barcode types section. This section (parameters 24 - 28) is repeated n times, where n is the number of barcode types to be allowed.

Tab. A-83 *Advanced worklist command PosID3_Scan, execution parameters (cont.)*

Par.	Name	Type	Range	Explanation
25	barcodeType	string1		Barcode type. Supported types (allowed strings): CODABAR Code128 Code2of5Interleaved Code39FullASCII Code39Standard EAN128
26	barcodeLength	string1		required barcode length
27	checkDigitMode	string1		checksum checking mode: a) Off = do not evaluate the checksum OnWithTransmission = evaluate and transmit OnWithoutTransmission = evaluate but don't transmit
28	startStopMode	string1		handling of start/stop codes: a) Off = start/stop code is not required OnWithTransmission = required and transmit OnWithoutTransmission = required but don't transmit

a) See 16.20.2.1 "PosID-3 Command (Barcode Types Tab)", 16-72 for more details.

The execution parameters are separated by commas.

Example:

```
FACTS("PosID3","PosID3_Scan","USER_ERRORPROMPT;False;True;SCANRESULT_FILE;True;OVERWRITE_BC;True;CARRIER_DEF;13;;;Tube 13 mm 16 Pos;5;1;LABWARE_DEF;Tubes Grid5;;Tube 13*100mm 16 Pos;0;0;;0;None;CARRIER_DEF;22;;;MP 3Pos;10;3;LABWARE_DEF;Grid10 Site1;;96 Well Microplate;0;0;;0;None;LABWARE_DEF;Grid10 Site2;;96 Well Microplate;1;0;;0;None;LABWARE_DEF;Grid10 Site3;;96 Well Microplate;2;0;;0;None;CARRIER_DEF;22;;;MP 3Pos;20;3;LABWARE_DEF;Grid20 Site1;;96 Well Microplate;0;0;;0;None;LABWARE_DEF;Grid20 Site3;;96 Well Microplate;2;0;;0;NotSet;BARCODETYPE_DEF;Code128;8;Off;Off;","0","");
```

A.15.9 Advanced Worklist Commands for the Te-Shake Shaker

The following describes the advanced worklist commands for the Te-Shake Shaker.

A.15.9.1 Init (Worklist: Shaker_Init)

The advanced worklist command which corresponds to the Te-Shake-Init device command is "Shaker_Init".

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.28.1 "Te-Shake shaker - Init Command", 16-90.

Tab. A-84 Advanced worklist command Shaker_Init, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Shaker","Shaker_Init","","0","");

A.15.9.2 Start (Worklist: Shaker_Start)

The advanced worklist command which corresponds to the Te-Shake-Init device command is “Shaker_Init”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.28.3 “Te-Shake shaker - Start Command”, 16-92.

Tab. A-85 Advanced worklist command Shaker_Start, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	direction	expression		direction of shaking: 1 = clockwise 2 = counter-clockwise
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Shaker","Shaker_Start","2","0","");

A.15.9.3 Stop (Worklist: Shaker_Stop)

The advanced worklist command which corresponds to the Te-Shake-Stop device command is “Shaker_Stop”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.28.4 “Te-Shake shaker - Stop Command”, 16-92.

Tab. A-86 *Advanced worklist command Shaker_Stop, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Shaker","Shaker_Stop","","0","");

A.15.9.4 SetTemperature (Worklist: Shaker_SetTemperature)

The advanced worklist command which corresponds to the Te-Shake-Init device command is “Shaker_SetTemperature”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.28.5 “Te-Shake shaker - SetTemperature Command”, 16-92.

Tab. A-87 *Advanced worklist command Shaker_SetTemperature, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	temperature	expression		required temperature in ºC * 10 (320 = 32ºC)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Shaker","Shaker_SetTemperature","320","0","");

A.15.9.5 SetFrequency (Worklist: Shaker_SetFrequency)

The advanced worklist command which corresponds to the Te-Shake-SetFrequency device command is “Shaker_SetFrequency”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.28.6 “Te-Shake shaker - SetFrequency Command”, 16-93.

Tab. A-88 Advanced worklist command Shaker_SetFrequency, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	cmd_name	string1		name of command
3	frequency	expression		required frequency in rpm
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Shaker","Shaker_SetFrequency","500","0","");

A.15.10 Advanced Worklist Commands for the Te-MagS

The following describes the advanced worklist commands for the Te-MagS Magnetic Bead Separator.

A.15.10.1 MoveToPosition (Worklist: Te-MagS_MoveToPosition)

The advanced worklist command which corresponds to the Te-Mags-MoveToPosition device command is “Te-MagS_MoveToPosition”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.32.1 “Magnetic Bead Separator - MoveToPosition Command”, 16-100.

Tab. A-89 Advanced worklist command Te-MagS_MoveToPosition, parameters

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	position	expression		required position: 0 = Dispense position 1 = Aspirate position 2 = Re-suspension position 3 = Incubation position Second field for this parameter: z-pos [a)]
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

a) Z-position (height) of the magnet block (range: 1 to 31 steps). The z-pos field is only specified for the Aspirate position and only if the z-position feature is activated (it is always omitted for Dispense, Re-suspension and Incubation). The Z-position feature requires special Te-MagS hardware. See 16.32.4 “Magnetic Bead Separator - Execution Command”, 16-102 for more information.

Example (z-position feature activated, z-pos set to 22):

FACTS("Te-MagS","Te-MagS_MoveToPosition","1 22","0","");

A.15.10.2 ActivateHeater (Worklist: Te-MagS_ActivateHeater)

The advanced worklist command which corresponds to the Te-Mags-ActivateHeater device command is “Te-MagS_ActivateHeater”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.32.2 “Magnetic Bead Separator - ActivateHeater Command”, 16-101.

Tab. A-90 *Advanced worklist command Te-MagS_ActivateHeater, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	temperature	expression		required temperature
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Te-MagS","Te-MagS_ActivateHeater","65","0","");

A.15.10.3 DeactivateHeater (Worklist: Te-MagS_DeactivateHeater)

The advanced worklist command which corresponds to the Te-Mags-DeactivateHeater device command is “Te-MagS_DeactivateHeater”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.32.3 “Magnetic Bead Separator - DeactivateHeater Command”, 16-102.

Tab. A-91 *Advanced worklist command Te-MagS_DeactivateHeater, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Te-MagS","Te-MagS_DeactivateHeater","","0","");

A.15.10.4 Execution (Worklist: Te-MagS_Execution)

The advanced worklist command which corresponds to the Te-Mags-Execution device command is “Te-MagS_Execution”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.32.4 “Magnetic Bead Separator - Execution Command”, 16-102.

Tab. A-92 *Advanced worklist command Te-MagS_Execution, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		one or more sets of parameters, one set for each line of the separation script. See following table.
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Tab. A-93 *Advanced worklist command Te-MagS_Execution, separation script parameters*

Separation script command	Par. 1	Par. 2	Par. 3	Par. 4	Par. 5	Par. 6
Magnetic mix	1:	cyles	hours	minutes	seconds	z-pos[a)]
Incubation	2:	hours	minutes	seconds		
Wait	3:	hours	minutes	seconds		
Move to position	4:	required position: 1 = Dispense 2 = Aspirate 3 = Re-suspension 4 = Incubation	z-pos[b)]			
Command	5:	firmware command				

a) Z-position (height) of the magnet block (range: 1 to 31 steps). The Z-position feature requires special Te-MagS hardware. See 16.32.4 “Magnetic Bead Separator - Execution Command”, 16-102 for more information

b) Z-position (height) of the magnet block (range: 1 to 31 steps). The z-pos field is only specified for the Aspirate position (this field is omitted for Dispense, Re-suspension and Incubation). Specify 31 if the Z-position feature is deactivated.

Magnetic mix has six parameters. Incubation and Wait have four parameters. Move to position has two or three parameters. Command has two parameters. Parameter 1 (command type) and parameter 2 are separated by “:”. The other parameters are separated by spaces. Parameter sets are separated by commas.

Example (z-position feature activated, z-pos set to 22 in two of the commands):

FACTS("Te-MagS","Te-MagS_Execution","1:3 0 0 15 22,3:0 0 25,2:0 0 40,4:2 22,5:RPZ1","0","");

A.15.11 Advanced Worklist Commands for the Te-Stack Stacker

The following describes the most important advanced worklist commands for the Te-Stack Stacker.

A.15.11.1 InitStacker (Worklist: Te-Stacker_InitStacker)

The advanced worklist command which corresponds to the Te-Stack-InitStacker device command is “Te-Stacker_InitStacker”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.34.1 “Te-Stack - InitStacker Command”, 16-108.

Tab. A-94 *Advanced worklist command Te-Stacker_InitStacker, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	exec_parameters	expression		no execution parameters (specify an empty string)
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:
FACTS("Te-Stacker","Te-Stacker_InitStacker","","0","");

A.15.11.2 ReturnPlate (Worklist: Te-Stacker_ReturnPlate)

The advanced worklist command which corresponds to the Te-Stack-ReturnPlate device command is “Te-Stacker_ReturnPlate”.
The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.34.3 “Te-Stack - ReturnPlate Command”, 16-108.

Tab. A-95 *Advanced worklist command Te-Stacker_ReturnPlate, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	tower	expression		stacker tower
4	needs_allwd_lw	expression		specify 1 (needs a specific labware type)
5	allowed_labware	expression		required labware type

Example:
FACTS("Te-Stacker","Te-Stacker_ReturnPlate","2","1","96_Well_Microplate");

A.15.11.3 PrepareReturnPlate (Worklist: Te-Stacker_PrepareReturnPlate)

The advanced worklist command which corresponds to the Te-Stack-PrepareReturnPlate device command is “Te-Stacker_PrepareReturnPlate”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.34.4 “Te-Stack - PrepareReturnPlate Command”, 16-109.

Tab. A-96 *Advanced worklist command Te-Stacker_PrepareReturnPlate, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	tower	expression		stacker tower
4	needs_allwd_lw	expression		specify 0 (does not need a specific labware type)
5	allowed_labware	expression		not relevant (specify an empty string)

Example:

```
FACTS("Te-Stacker","Te-Stacker_PrepareReturnPlate","2","0","");
```

A.15.11.4 PresentPlate (Worklist: Te-Stacker_PresentPlate)

The advanced worklist command which corresponds to the Te-Stack-PresentPlate device command is “Te-Stacker_PresentPlate”.

The parameters of the advanced worklist command are shown in the following table. For more information on this command see 16.34.5 “Te-Stack - PresentPlate Command”, 16-109.

Tab. A-97 *Advanced worklist command Te-Stacker_PresentPlate, parameters*

Par.	Name	Type	Range	Explanation
1	devicename	string1		name of device
2	commandname	string1		name of command
3	tower	expression		stacker tower
4	needs_allwd_lw	expression		specify 1 (needs a specific labware type)
5	allowed_labware	expression		required labware type

Example:

```
FACTS("Te-Stacker","Te-Stacker_PresentPlate","2","1","96_Well_Microplate");
```

B Appendix B - FDA 21 CFR Part 11 Compliance

The United States Food and Drug Administration (FDA) issued a set of regulations in 1997 that outlines its criteria for acceptance of electronic records, electronic signatures and handwritten signatures (referred to as 21 CFR Part 11). The regulations state the conditions under which the FDA considers electronic signatures and electronic records to be trustworthy, reliable and equivalent to traditional handwritten signatures on paper. The criteria were provided in response to industry requests. In this manner, it defines the conditions under which an organization must operate to meet its record keeping and record submission requirements when it uses electronic records and signatures rather than paper records and handwritten signatures.

The preamble to the 21 CFR Part 11 rule states that “the use of electronic records as well as their submission to the FDA is voluntary”. However, where an organization does decide to use electronic records and electronic signatures, the requirements must be met in full for all relevant electronic records. Organizations that wish to operate under 21 CFR Part 11 must take the steps described in this appendix to ensure complete compliance.

B.1 Related Documentation

The following publications from the FDA contain useful information on the 21 CFR Part 11 regulations:

21 CFR Part 11, Electronic Records; Electronic Signatures; Final Rule; Department of Health and Human Services, Food and Drug Administration, March 20, 1997;

Guidance for Industry – 21 CFR Part 11 – Electronic Records & Electronic Signatures – Maintenance of Electronic Records;

Guidance for Industry – 21 CFR Part 11 – Electronic Records & Electronic Signatures – Glossary of Terms.

B.2 Purpose of this Appendix

This appendix discusses the major requirements of the 21 CFR Part 11 regulations and details the technical features which have been implemented in the Tecan Freedom EVOware software to help Tecan customers to reach compliance. It also indicates which steps the Tecan customers must carry out to achieve compliance.

The main part of this appendix discusses the relevant issues in the 21 CFR Part 11 regulations rule by rule and identifies how Freedom EVOware helps to ensure compliance with the regulations and what Tecan customers must do to achieve compliance. Refer to the FDA website and FDA publications for the full text of the regulations.

The regulations primarily require analytical laboratories to consider the following points:

- The use of validated equipment and computer systems,
- Secure retention of electronic records to instantly reconstruct analyses,
- Computer-generated, time-stamped audit trails,

- System and data security, data integrity and confidentiality through limited authorized system access,
- Secure electronic signatures for closed and open systems,
- Digital signatures for open systems.

Implementing the new regulations will significantly affect the instrumentation, work processes and people in laboratories that set out to be compliant. The current process of generating signatures must be evaluated (Who has to sign what, why and when?). New procedures must be developed within companies and laboratories to limit the access to systems and data (Who can do what?). Computer systems used for implementation may need to be updated or replaced to ensure correct functionality. Finally, the manner of using and handling user names and passwords for legally binding signatures may have to change.

Key topics covered by the regulations are:

Validation: Validation of the system that creates and maintains electronic records to ensure accuracy, reliability, consistent intended performance and the ability to discern invalid or altered records.

Controlled system access: Limiting system access to authorized individuals only.

Audit trails: The usage of secure, computer-generated, time-stamped trails (older process data and log files must be archived and must not be deleted).

System controls: Operational system procedures (to enforce the correct sequencing of steps and events).

Accurate and complete copies: Procedures to ensure that only authorized individuals can use the system, electronically sign a record, access the operation or computer system, input or output device, alter a record or perform the operation at hand.

Protected systems and records:

- The ability to create accurate and complete copies of records – the system must allow the creation of accurate and complete copies of the electronic records in human-readable as well as in electronic form for inspection and review by the FDA.
- The protection of records, for example by an appropriately applied system of access privileges or rights in the Microsoft Windows file system and/or network directories to enable accurate and ready
- The ability to retrieve process data, log files and audit trails data throughout the required retention period of the records.

Adequate training: Sufficient education, training and experience for persons who develop, maintain and use the electronic systems.

B.3 Definitions and Acronyms

The following explains key terms which are used in this section of the manual and/or are used in the FDA documentation on the CFR Part 11 regulations.

ASCII

American Standard Code for Information Interchange. A standard for assigning numerical values to the set of letters in the Roman alphabet and typographic characters.

Audit trail

A computer-generated and time stamped record of who did what and when. In the context of Freedom EVOware, audit trails are the sets of process data and log files which are automatically generated by the software

Authenticated access, authority checks

Systems used to establish and verify as conclusively as possible that a person logging in to the network is who he or she claims to be. According to the FDA, "*authority checks*" should be designed to "*ensure that only authorized individuals can use the system, electronically sign a record, access the operation or computer system input or output device, alter a record or perform operations*".

Biometrics

In the context of computer security, this refers to authentication techniques that rely on measurable physical characteristics that can be automatically checked, such as fingerprints, speech or retinal patterns. Freedom EVOware does not support biometric methods to verify an individual's identity.

Checksum

A checksum is a computed value which depends on the contents of a block of data. The checksum is re-computed for the received data and compared with the checksum sent with the data. If the two values are the same, the recipient of the data can be confident that the data was received correctly. Freedom EVOware uses a checksum system which is based on the CRC algorithm to protect important files. The checksum is used to detect corrupted or otherwise altered data. It is also able to detect whether files have been modified outside of Freedom EVOware by another program or process.

Closed system

An environment in which system access is controlled by persons who are responsible for the content of electronic records that are on the system. Freedom EVOware is a closed system.

CRC

A Cyclic Redundancy Check is a computed value which is used to detect corrupted or otherwise altered data.

Data integrity

Validity of data and its relationships. In order for electronic records to be trustworthy and reliable, the links between raw data, meta-data and results must not be compromised or broken. Without data integrity, it is not possible to reliably regenerate a previous result.

Digital signature

An electronic signature based upon cryptographic methods of originator authentication, computed by using a set of rules and a set of parameters such that the identity of the signer and the integrity of the data can be verified.

Disabled account

A user account that has its access turned off so that it is not usable until such time as access is granted again.

Electronic record

Any combination of text, graphics, data, audio, pictorial or other information representation in digital form that is created, modified, maintained, archived, retrieved or distributed by a computer system.

Electronic signature

A computer data compilation of any symbol or series of symbols executed, adopted or authorized by an individual to be the legally binding equivalent of the individual's handwritten signature.

Encryption

Translation of data into a secret code in order to make the data secure.

FDA
Food and Drug Administration (US regulatory authority).

File
A collection of data records stored as a unit with a single name.

Handwritten signature
The scripted name or legal mark of an individual handwritten by that individual and executed or adopted with the present intention to authenticate writing in a permanent form. The act of signing with a writing or marking instrument such as a pen or stylus is preserved. The scripted name or legal mark, while conventionally applied to paper, may also be applied to other devices that capture the name or mark.

Inactivity disconnect or locked session
This is a computer session that freezes or logs off automatically when no data has been input for a period of time.

Integrated data organization system, logical security or internal logic
Data management planning and configuring that combines the diverse applications used by a company with the operating system in such a way that authentication and authorization are achieved most efficiently and effectively.

Login or login credentials (user name or user ID)
Identification methods that make a computer system recognize users so they can begin computer sessions, usually based on user names and passwords.

Meta Data
Important for reconstructing a final report from raw data. Meta data includes integration parameters and calibration tables.

Open system
An environment in which system access is not controlled by persons who are responsible for the content of electronic records that are on the system. This is not applicable to Freedom EVOware. Freedom EVOware is a closed system and is not designed for an open system.

Operating system
The operating system is the most important program that runs on a computer. It performs basic tasks such as recognizing input from the keyboard, sending output to display screens, keeping track of files and directories, controlling access to files and directories and controlling peripherals such as printers.

Passwords
Ideally, a password is something nobody can guess.

Permissions or privileges
These are security codes that define or restrict which users can read, write and execute the associated files, directories or programs. Some departments only need to look at data, some need to input data or run programs and others may not need to look at the data at all.

Private data
Personal directories on a file server which are only accessible by the owner of the data.

Programs
An organized list of instructions that causes a computer to behave in certain predetermined ways.

Raw Data
Data which has not yet been analyzed.

Security mechanisms

This refers to techniques for ensuring that data stored in a computer cannot be read or compromised. Most security measures involve encryption or passwords.

Server

A computer or device on a network that manages network resources. A *file server* stores files, a *print server* manages printers, a *network server* manages network traffic *and* a *database server* processes database inquiries.

Service release or service pack

Defect-fix releases of an operating system that address serious issues or defects reported against a previous release. Service releases need to be installed on top of the original software. Service releases often address security issues which have arisen during the use of the software. Generally speaking, you should install the operating system service release specified for the Freedom EVOware software to ensure maximum system security.

Shared desktop, account or login

Shared desktops, accounts or logins can violate the principle of no repudiation. If the audit trail is not able to distinguish between individuals using such shared network resources, an electronic signature is not valid.

Tecan customer

Company or organization which uses pipetting instruments and/or other equipment which is manufactured by Tecan.

User name, User ID

A unique code used together with a password to identify a user.

Validation of a computer system

Confirmation by examination and provision of objective evidence that computer system specifications conform to user needs and intended uses, and that all requirements can be consistently fulfilled.

B.4 Recommendations

The following lists points to be considered to ensure compliance with 21 CFR Part 11.

Access security determines who is allowed to log in to a system locally or from a network and puts mechanisms in place that prevent unauthorized persons from gaining access to the computer system. For example, the Microsoft operating systems Windows 2000, NT and XP provide several different types of access privileges or rights that can be granted or denied to specific users or groups of users.

System administrator: The person responsible for maintaining a multi-user computer system and managing the security of the computer network.

Audit trails: 21 CFR Part 11 requires audit trails to be generated independently of the equipment operator. They must record all activities related to creating, modifying and deleting records on the system. The user organization must develop procedures for the data integrity and long-term archiving of audit trails with data retrieval throughout the legally required retention period.

Configuration settings: An overall organizational structure defining how permissions or privileges are configured for the computer system, with settings which may e.g. allow one user to only read a file while another person can execute the file and a third person can write new data into it.

Consider whether all signatures which are used now are really needed from a regulatory point of view.

Create an infrastructure which will allow smooth implementation of the regulations.

Create awareness of the regulations among all employees, especially regarding their accountability for electronic signatures.

Decide whether to use full electronic records and signatures or hybrid systems (records in electronic and paper format). Report all decisions in your process records.

Develop an implementation plan for the user organization and the laboratory.

Develop procedures for limiting system access to authorized individuals.

Form a task group with members from the information technology department (if existing), quality assurance personnel and laboratory staff.

Establish procedures for limiting system access to authorized individuals.

Identify all work or activities in the organization or laboratory that will fall under 21 CFR Part 11.

Look at all of the equipment in the laboratory and develop a plan for making it comply with CFR 21 Part 11.

Provide functional specifications for computerized systems in the laboratory.

Train personnel in the user organization and in the laboratory on the application and consequences of the regulations.

Validate new computer systems. Follow the equipment qualification approach with design qualification, installation qualification, operational qualification and performance qualification.

B.4.1 Assigning and Using Freedom EVOware User Names

User names in Freedom EVOware are unique. To allow laboratory personnel to be uniquely identified by auditors, Tecan customers must provide each of them with his or her own Freedom EVOware user name. The same user name must not be used by groups of users. In addition, Tecan customers must not reassign user names for use by different employees, for example if a change of staff takes place or if an employee leaves the company. In such cases, the user name should be disabled and no longer used.

Tecan customers must instruct their employees not to reveal their user name and password combinations or to share them with other employees, and to log out before allowing another employee to use Freedom EVOware or if they plan to leave the running system unattended (see 6.1.9 “Lock EVOware”, 6-7).

B.5 Security Features in the Software Which Assist 21 CFR Part 11 Compliance

B.5.1 Closed Systems

Freedom EVOware is a closed system and access to Freedom EVOware requires a combination of user name and password for unique identification. Freedom EVOware cannot be used without a valid user name and password. The Tecan User Management system also require the user’s full name to be specified when the user account is created.

This mechanism provides both the ability to carry out authority checks and the ability to sign and/or authorize electronic records. Each user is traceable and accountable for his or her actions, process data and configuration changes.

To maximize security, the Freedom EVOware access control mechanisms are independent of the access control mechanisms in the Microsoft operating system. Accordingly, user accounts and passwords for the operating system and for the Freedom EVOware system are managed separately. Freedom EVOware user accounts are managed with the Tecan User Management system. User accounts for the Microsoft operating system are managed using standard Microsoft tools and procedures.

B.5.2 Freedom EVOware User Levels

There are four user levels in Freedom EVOware:

Operator, Power User, Application Specialist and Administrator.

Operator has rights to:

- Run a pipetting script (Freedom EVOware Standard) or process (Freedom EVOware Plus)
- Run maintenance scripts (see 6.4.2 “Run Maintenance”, 6-10)
- View a pipetting script (but not change it)
- Handle errors during pipetting

Power User: Same rights as Operator but with additional rights to:

- Start running pipetting scripts at a specified line number.
- Run direct commands (see 5.4.1.3 “Direct commands”, 5-10)

Application Specialist: Same rights as Operator but with additional rights to:

- Create, modify and save pipetting scripts (Freedom EVOware Standard and Freedom EVOware Plus) and processes (Freedom EVOware Plus)
- Edit the configuration of the pipetting instrument
- Edit the configurations of carriers and labware
- Edit the liquid classes for pipetting
- Change settings in the Freedom EVOware Configuration Tool
- Skip pre-programmed timers during pipetting,

Administrator: Same rights as Application Specialist but with additional rights to:

- Create and disable/re-enable users
- Configure the options in the Tecan User Management system
- Enable or disable the Electronic Signatures feature

B.5.3 Tecan User Management System

The Tecan User Management system, which is used by Freedom EVOware and other Tecan software components, has the following main features:

- All changes relating to user management require Freedom EVOware Administrator access rights.
- All changes relating to user management are recorded in the user management audit trail.
- User accounts are automatically disabled following a configurable number of consecutive failed attempts to enter the correct user name and password combination. The disabled account can only be reactivated again by the Freedom EVOware Administrator.

- Freedom EVOware does not allow more than one person to use the software simultaneously.
- Users can log out without leaving Freedom EVOware or interrupting a running pipetting script or process. The same or a different user can then log in to Freedom EVOware again while the script or process is still running. See 6.1.9 “Lock EVOware”, 🗎 6-7.
- Users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected.
- User passwords expire after a configurable number of days. The user must then choose another password. The new password must be different from the old password.
- Passwords must contain a specified minimum number of characters.
- Passwords can be forced to contain numeric digits.
- Passwords cannot be reused.
- User names and user name and password combinations are unique within the system and cannot be assigned more than once.
- The Freedom EVOware Administrator provides a temporary password when setting up a user. When the new user first logs on to the system, he or she is forced to change the password immediately. This ensures that no one other than the individual user knows the particular user name and password combination.
- If a user forgets his/her password, the Freedom EVOware Administrator does not have access to the user’s password. The Freedom EVOware Administrator is only able to reset the password and provide a new temporary password.
- If the Freedom EVOware Administrator forgets his or her password, no one has access to the password.
- A specified person (typically the Freedom EVOware Administrator) can be automatically notified by eMail in case of potential security threats (e.g. a user account has been disabled after a configurable number of consecutive failed login attempts).

B.5.3.1 User Management Audit Trail

All changes relating to user management are recorded in the user management audit trail. A new file is written to the <install_path>\AuditTrail\Configuration directory each time you start and then exit the Freedom EVOware Configuration Tool. The file name is UserTrailYYYYMMDD_HHMMSS, where YYYYMMDD is the file creation date and HHMMSS is the file creation time.

B.5.4 Checksums

Freedom EVOware uses a checksum system which is based on a CRC algorithm to protect configuration, script, trace and log files. The checksum is a computed value which is used to detect corrupted or otherwise altered data. It is also able to detect whether files have been modified outside of Freedom EVOware by another program or process. The checksum is stored in the file header.

The Data Explorer can be used to check whether Freedom EVOware configuration and data files have valid checksums (see A.9.1 “Data Explorer Tool”, 🗎 A-35).

The plain text header of each file can also be viewed independently of Freedom EVOware using a suitable editor. The following information is stored in the header:

- CRC checksum

- Date and time of creation or modification
- User name
- User-specified reason for the change (if the Electronic Signatures feature is enabled in the Freedom EVOware Configuration Tool) See B.5.5 “Electronic Signatures”, B-9.
- User’s full name

A warning is shown if an attempt is made to load a file with an incorrect or missing checksum. The user can then choose to load the file or cancel. In the latter case, Freedom EVOware aborts with the exception of script files. In this case, the file is not loaded but Freedom EVOware remains running. An entry is written to the log file each time an incorrect or missing checksum is found.

Note: *A user with Freedom EVOware Administrator rights can enable or disable the incorrect checksum warning using the Freedom EVOware Configuration Tool (see 8.3.1.4 “Protocol Options Tab”, 8-8). To comply with the FDA regulations, this feature must not be disabled.*

B.5.5 Electronic Signatures

The Freedom EVOware security features ensure that the currently logged in user can be uniquely identified. Furthermore, Freedom EVOware users should be instructed never to leave the running system unattended without first logging out.

To ensure full compliance with 21 CFR Part 11, the Freedom EVOware Administrator must also activate Freedom EVOware’s Electronic Signatures feature, which provides support for a series of signings in one session.

The Electronic Signatures feature records user input on the reason for creating or changing configuration files, data files and user management settings. It helps to identify why the user performed a specific action.

Note: *A user with Freedom EVOware Administrator rights can enable or disable the electronic signatures feature using the Freedom EVOware Configuration Tool (see 8.3.1.4 “Protocol Options Tab”, 8-8). To comply with the FDA regulations, this feature must not be disabled.*

If the Electronic Signatures feature is activated, a dialog box is shown when carrying out one of the following actions:

- Creating, deleting or editing script files and script templates
- Creating, deleting or editing process files and process templates
- Creating, deleting or editing worktable templates
- Creating, deleting or editing carrier definitions
- Creating, deleting or editing labware definitions
- Creating, deleting or editing liquid classes
- Making changes to configuration settings
- Creating, deleting or editing users, groups and password rules

The currently logged in user must re-enter his or her password and specify the reason for the change:

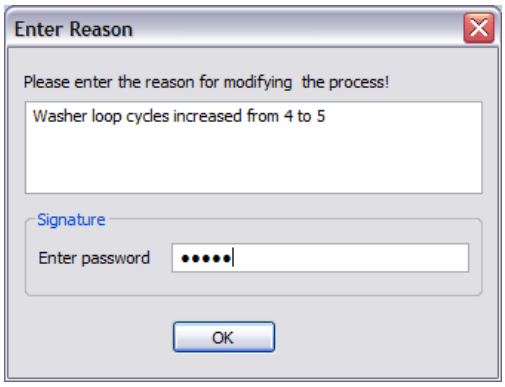


Fig. B-1 *Password prompt with the Electronic Signatures feature active*

After confirming the entries by clicking OK, an electronic signature is executed and an entry is made in Freedom EVOware's trace file.

The Data Explorer can be used to view the user comment for each of these files (see A.9.1 "Data Explorer Tool", A-35). Only the most recent comment is saved in the file. Earlier comments are stored with previous versions of these files, which are automatically backed up to the <install_path>\AuditTrail\Configuration directory (see A.5 "Freedom EVOware Directory Structure and Files", A-25).

The plain text header of each file can also be viewed independently of Freedom EVOware using a suitable editor. The following information is stored in the header:

- CRC checksum
- Date and time of creation or modification
- User name
- User-specified reason for the change (if the Electronic Signatures feature is enabled in the Freedom EVOware Configuration Tool)
- User's full name

A user comment is required by 21 CFR Part 58 (GLP) but not by 21 CFR Part 11, although some customers want to record this type of information anyway.

If one of the above changes has been made automatically by Freedom EVOware, a comment is inserted which starts with "EVOware:"

B.5.6 Trace File (Audit Trail)

The trace file contains information on configuration, data and log files which have been created, edited or saved. The default location for the trace file is <install_path>\AuditTrail\Log.

Each time a configuration, data or log file is created or modified, a CRC checksum is stored in the file and an entry is made in the trace file.

Each entry in the trace file specifies the date and time, the name of the currently logged in user and the file name. Log files are created by Freedom EVOware automatically and a user name is not included in the trace file entry in this case. The trace file can be viewed with a plain text editor.

Each time a configuration or data file is modified and saved, the previous version is archived in the <install_path>\AuditTrail\Configuration sub-directory. The date and time is appended to the original filename. The archive copy includes the user-specified reason for the change if "Electronic Signatures" is enabled in the Freedom EVOware Configuration Tool (see B.5.5 "Electronic Signatures", B-9).

All changes relating to user management are recorded in the user management audit trail (see B.5.3.1 “User Management Audit Trail”, B-8).

B.5.7 Log Files

Freedom EVOware creates log files to document the pipetting and to record user actions and changes to parameter values, etc. (see A.1 “Overview of the Log Files”, A-1).

The log files are written to the directory <install_path>\AuditTrail\Log and are protected with checksums which are stored in each file.

Freedom EVOware users with Administrator or Application Specialist rights can activate several log file types with different levels of logging detail, either individually or in combination. See A.1 “Overview of the Log Files”, A-1 for more information.

- A new log file of type EVO (file name EVO*.log) is created each time Freedom EVOware is started. It contains initialization information from the Freedom EVOware software, the Freedom EVOware version number and the serial number of the pipetting instrument. It also contains information on the hardware options and external devices which are currently connected to the pipetting instrument, including their firmware versions.
- A new log file of type EVO is also created each time a pipetting script is started. It contains information about the script, the position of the instrument arms and the instrument settings.
- Each time the pipetting instrument is initialized, Freedom EVOware writes information on the positions of arms, the connected external devices and the COM ports into a new log file of type EVO.
- In addition, the Export Data command can be included in pipetting scripts to create report files on pipetting operations (see 15.26 “Export Data Command”, 15-48).

B.5.8 Backing Up Files

Freedom EVOware’s Configuration Tool provides functions for backing up and restoring important files. Backup and restore operations are reported in the Freedom EVOware trace file. See 8.2 “Backing Up and Restoring Your Configuration”, 8-3 for a list of the files which are backed up.

B.6 Part A - General Provisions

B.6.1 § 11.1 Scope

The structure of this section of the manual is based on *21 CFR Part 11, Electronic Records; Electronic Signatures; Final Rule*; Department of Health and Human Services, Food and Drug Administration, March 20, 1997 and discusses the key points in each of the relevant sections, giving information on the steps which are required to attain FDA compliance.

B.6.1.1 § 11.1(a) Criteria

Compliance Freedom EVOware

The features implemented in Freedom EVOware that deal with electronic records and electronic signatures are described in detail in the following sections and in B.5.5 “Electronic Signatures”, B-9.

Compliance Tecan Customer

Tecan customers must develop a procedure to establish criteria under which electronic records, electronic signatures and handwritten signatures executed on electronic records are considered to be trustworthy, reliable and generally equivalent to paper records and handwritten signatures.

B.6.1.2 § 11.1(b) Records In Electronic Form

Compliance Freedom EVOware

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See A.5 “Freedom EVOware Directory Structure and Files”, A-25 for a list of the files and directories which are used. See also B.5.6 “Trace File (Audit Trail)”, B-10.

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See 8.3.1.4 “Protocol Options Tab”, 8-8.

Compliance Tecan Customer

Tecan customers must develop a procedure to document which records in electronic form are created, modified, maintained, archived, retrieved or transmitted and where the records are stored on the computer system. This does not apply to paper records that are transmitted by electronic means.

B.6.1.3 § 11.1(c) Electronic Signatures

Compliance Freedom EVOware

Freedom EVOware uses electronic signatures on data and configuration files. See B.5.5 “Electronic Signatures”, B-9 for more information.

Compliance Tecan Customer

Tecan customers must develop a procedure to identify where electronic signatures and their associated electronic records are equivalent to handwritten signatures.

B.6.1.4 § 11.1(d) Electronic Records

Compliance Freedom EVOware

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See A.5 “Freedom EVOware Directory Structure and Files”, A-25 for a list of the files and directories which are used. See also B.5.6 “Trace File (Audit Trail)”, B-10.

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See 8.3.1.4 “Protocol Options Tab”, 8-8.

Compliance Tecan Customer

Tecan customers must specify where electronic records are used instead of paper records.

B.6.1.5 § 11.1(e) Computer Systems

Compliance Freedom EVOware

As an important tool for quality assurance, Tecan has developed detailed guidelines and rules for all phases of hardware and software development and testing.

Compliance Tecan Customer

Tecan customers must name the computer systems (hardware and software) and the documents which will be made available for FDA inspections.

B.6.2 § 11.2 Implementation

B.6.2.1 § 11.2(a) Required Records

Compliance Freedom EVOware

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See A.5 “Freedom EVOware Directory Structure and Files”, A-25 for a list of the files and directories which are used. See also B.5.6 “Trace File (Audit Trail)”, B-10.

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. 8.3.1.4 “Protocol Options Tab”, 8-8.

Compliance Tecan Customer

Tecan customers must keep copies of all records which are required for FDA inspections and establish reliable procedures to make all technical processes comprehensible and understandable.

B.6.2.2 § 11.2(b) Submitted Records

Compliance Freedom EVOware

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See A.5 “Freedom EVOware Directory Structure and Files”, A-25 for a list of the files and directories which are used. See also B.5.6 “Trace File (Audit Trail)”, B-10.

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See 8.3.1.4 “Protocol Options Tab”, 8-8.

Compliance Tecan Customer

Tecan customers must keep copies of all records which are required for FDA inspections and provide reliable procedures to make all technical processes comprehensible and understandable.

B.6.2.3 § 11.2(b) Requirements

Compliance Freedom EVOware

As an important tool for quality assurance, Tecan has developed detailed guidelines and rules for all phases of hardware and software development and testing.

Compliance Tecan Customer

Tecan customers must develop a procedure to ensure compliance with all FDA requirements.

B.6.2.4 § 11.2(b) Identification

Compliance Freedom EVOware

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See A.5 “Freedom EVOware Directory Structure and Files”, A-25 for a list of the files and directories which are used. See also B.5.6 “Trace File (Audit Trail)”, B-10.

Compliance Tecan Customer

Tecan customers must specify the records which will be made available for FDA inspections.

B.7 Part B - Electronic Records

B.7.1 § 11.10 Control of Closed Systems

§ 11.10 describes controls for closed systems (systems to which access is controlled by persons responsible for the content of the electronic records on that system). These controls include measures designed to ensure the integrity of system operations and information stored in the system. It also addresses the security of closed systems.

B.7.1.1 § 11.10(a) Validation of System

⌦ Hardware and software

Compliance Freedom EVOware

Software verification

Tecan provides objective evidence that the design outputs of a particular phase of the software development life cycle meet all of the specified requirements for that phase. Software verification looks for consistency, completeness and correctness of the software and its supporting documentation as it is being developed and provides support for a subsequent conclusion that the software is validated.

As an important tool for quality assurance, Tecan has developed detailed guidelines and rules for all phases of hardware and software development and testing.

Software testing is one of many verification activities which are carried out to confirm that software development output meets its input requirements. Other verification activities include various static and dynamic analyses, code and document inspections, walkthroughs and other techniques.

Supported hardware

See 3.5 “Computer Requirements”, 🗎 3-7 for a list of supported hardware.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure for validating the system. The purpose of validation is “… *to ensure accuracy, reliability, consistent intended performance and the ability to discern invalid or altered records*”. This applies to both new and existing systems.

⌦ Database

Compliance Freedom EVOware

Tecan does not use a database in its Freedom EVOware software.

Compliance Tecan Customer

Tecan customers must develop and implement a validation procedure if they want to make a connection between the Tecan software and a database.

⌦ Network

Compliance Freedom EVOware

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See A.5 “Freedom EVOware Directory Structure and Files”, 🗎 A-25 for a list of the files and directories which are used. See also B.5.6 “Trace File (Audit Trail)”, 🗎 B-10.

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See 8.3.1.4 “Protocol Options Tab”, 🗎 8-8.

Compliance Tecan Customer

Tecan customers must develop and implement a validation procedure for their computer network. This includes managing user access and other security aspects, data backups and archiving.

⌦ Validation master plan

Compliance Freedom EVOware

As an important tool for quality assurance, Tecan has developed detailed guidelines and rules for all phases of hardware and software development and testing. The guidelines also cover validation and verification of product requirements.

21 CFR Part 11 contains rules for both closed and open computer systems.

Freedom EVOware is a closed system and is not designed for an open system.

Compliance Tecan Customer

Tecan customers must develop and implement a master plan to validate the complete system with all instruments and instrument connections.

⌦ Installation qualification

Compliance Freedom EVOware

This does not lie in the scope of the Freedom EVOware software.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure for installation qualification. This can be done e.g. by setting up and then validating a Freedom EVOware script.

Installation qualification may also be connected with user management and rules on who can install what, when and where.

⌦ Operational qualification

Compliance Freedom EVOware

This does not lie in the scope of the Freedom EVOware software.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure for routine operational qualification for all persons using the Tecan equipment.

This can be done e.g. by using a “control” or “standard” during pipetting or by performing dedicated validation runs.

⌦ Control procedures

Compliance Freedom EVOware

Freedom EVOware does not provide direct support for control procedures.

Compliance Tecan Customer

Tecan customers must develop and implement control procedures.

⌦ Detecting invalid and/or altered records

Compliance Freedom EVOware

See B.5.4 “Checksums”, B-8.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure for documenting invalid and/or altered records.

B.7.1.2 § 11.10 (b) Ability to Generate Accurate and Complete Copies of Records.

⌦ Storage of instrument control, pipetting sequence, data acquisition and data evaluation parameters together with audit trails and raw data

Compliance Freedom EVOware

See B.5.7 “Log Files”, 🗎 B-11.

See B.5.6 “Trace File (Audit Trail)”, 🗎 B-10.

See B.5.5 “Electronic Signatures”, 🗎 B-9.

Compliance Tecan customer

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion. This is a pre-requirement for reliable and trustworthy records that withstand scrutiny from regulators. The audit trail associated with the records must also be retained.

Tecan customers must establish rigorous and systematic archiving and backup procedures to ensure that electronic records generated by Freedom EVOware are stored in such a manner that they can be retrieved and used over an extended period of time.

In some cases, the records must be kept for 10 years or longer. Due to the expected technical changes in hardware and software over such time spans, this requires consideration of issues such as the appropriate choice of storage media, file formats, etc.

The regulations refer to the use of electronic records and signatures, not to which records need to be retained or for how long.

⌦ Versioning of data and all associated meta data (including automatic versioning of re-integrated results)

Compliance Freedom EVOware

See B.5.7 “Log Files”, 🗎 B-11.

See B.5.6 “Trace File (Audit Trail)”, 🗎 B-10.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion.

⌦ Audit trail of all data

Compliance Freedom EVOware

See B.5.7 “Log Files”, 🗎 B-11.

See B.5.6 “Trace File (Audit Trail)”, 🗎 B-10.

Compliance Tecan Customer

The integrity and completeness of the electronic records relies on the customer’s assignment of Microsoft Windows access rights for the PC and the computer network and on data backup and archiving procedures.

Tecan customers must set appropriate access privileges for the local and network files and directories to ensure that records can only be deleted or modified by authorized persons.

⌦ Protection of data with checksums

Compliance Freedom EVOware

See B.5.4 “Checksums”, 🗎 B-8.

Compliance Tecan Customer

No action required.

B.7.1.3 § 11.10 (c) Protection of records

⌦ Data Archiving Processes and Procedures for Long-term Data Storage

Compliance Freedom EVOware

See B.5.8 “Backing Up Files”, 🗎 B-11.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion.

In some cases, the records must be kept for 10 years or longer. Due to the expected technical changes in hardware and software over such time spans, this requires consideration of issues such as the appropriate choice of storage media, file formats, etc.

⌦ Protection of directories used to store process data and log files to ensure that they are only accessible to authorized persons

Compliance Freedom EVOware

Freedom EVOware uses specified directories to store process data, the trace file (audit trail) and the log files. A default directory structure is created for these files when Freedom EVOware is first installed. See A.5 “Freedom EVOware Directory Structure and Files”, 🗎 A-25 for a list of the files and directories which are used. See also B.5.6 “Trace File (Audit Trail)”, 🗎 B-10.

If required, users with Freedom EVOware Administrator or Application Specialist rights can configure Freedom EVOware to use other directories (including network directories) for storing data, log and output files. See 8.3.1.4 “Protocol Options Tab”, 🗎 8-8.

Compliance Tecan Customer

The integrity and completeness of the electronic records relies on the customer’s assignment of Microsoft Windows access rights for the PC and the computer network and on data backup and archiving procedures.

Tecan customers must set appropriate access privileges for the local and network files and directories to ensure that records can only be deleted or modified by authorized persons.

⌦ Access to process data and log files after a number of years

Compliance Freedom EVOware

No action required.

Compliance Tecan Customer

Tecan customers must establish rigorous and systematic archiving and backup procedures to ensure that electronic records generated by Freedom EVOware are stored in such a manner that they can be retrieved and used over an extended period of time.

In some cases, the records must be kept for 10 years or longer. Due to the expected technical changes in hardware and software over such time spans, this requires consideration of issues such as the appropriate choice of storage media, file formats, etc.

B.7.1.4 § 11.10 (d) Limiting System Access to Authorized Individuals

⌦ Microsoft operating system

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, B-6.

See B.5.3 “Tecan User Management System”, B-7.

Compliance Tecan Customer

Tecan customers must develop and implement user management procedures for their employees to control access to the Freedom EVOware software and the Microsoft operating system.

The access control mechanisms should be designed to prevent unauthorized persons from gaining access to, altering or deleting records in the system or carrying out unauthorized functions within the system.

Access security is typically ensured with a number of behavioral controls or policies that are backed up and enforced by appropriate security mechanisms implemented on the company’s information systems.

Access control determines who is allowed to log on to a system locally or from the network. The Microsoft operating systems offers several different types of access privileges that can be granted or denied to specific users or groups of users.

Under consideration of typical work practices in analytical laboratories, we recommend a system of access privileges on a task basis - not only to ensure confidentiality, but also to eliminate human mistakes or accidental loss of data.

It is insufficient to only restrict system access to a group of individuals without differentiating their responsibilities, knowledge or position. In this case, users could inadvertently modify system settings in a way that affects the integrity or security of the records.

⌦ Different Levels of Access Based On User Responsibilities

Compliance Freedom EVOware

See B.5.2 “Freedom EVOware User Levels”, B-7.

Compliance Tecan Customer

See B.4.1 “Assigning and Using Freedom EVOware User Names”, B-6.

B.7.1.5 § 11.10 (e) Use of Computer-generated, Time-stamped Audit Trails

☒ Audit trails are used to record the activities of Freedom EVOware users as well as data transfers (who, what, when)

Compliance Freedom EVOware

See B.5.7 “Log Files”, B-11.

See B.5.6 “Trace File (Audit Trail)”, B-10.

See B.5.3.1 “User Management Audit Trail”, B-8.

See B.5.5 “Electronic Signatures”, B-9.

See B.5.8 “Backing Up Files”, B-11.

Compliance Tecan Customer

The integrity and completeness of the electronic records relies on the customer’s assignment of Microsoft Windows access rights for the PC and the computer network and on data backup and archiving procedures.

Tecan customers must set appropriate access privileges for the local and network files and directories to ensure that records can only be deleted or modified by authorized persons.

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion.

☒ Audit trail of all integration and re-integration processes

Compliance Freedom EVOware

See B.5.7 “Log Files”, B-11.

See B.5.6 “Trace File (Audit Trail)”, B-10.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure to store and archive the process data, the trace file (audit trail) and the log files created by Freedom EVOware and protect them against accidental or intentional modification, falsification or deletion.

☒ Audit trail information includes the instrument’s serial number

Compliance Freedom EVOware

See B.5.7 “Log Files”, B-11.

Compliance Tecan Customer

No action required.

☒ Audit trail when data is transferred to and from a database

Compliance Freedom EVOware

Tecan does not use a database in its Freedom EVOware software.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure for recording data transfer from and to the database if they make a connection between the Tecan software and a database.

⌦ Audit trail data must be protected from accidental or intentional modification or deletion

Compliance Freedom EVOware

See B.5.4 “Checksums”, B-8.

Compliance Tecan Customer

The integrity and completeness of the electronic records relies on the customer’s assignment of Microsoft Windows access rights for the PC and the computer network and on data backup and archiving procedures.

Tecan customers must set appropriate access privileges for the local and network files and directories to ensure that records can only be deleted or modified by authorized persons.

⌦ Audit trail aspects of data migration to new Freedom EVOware **version or operating system version**

Compliance Freedom EVOware

Although Freedom EVOware software migration does not delete existing process data, audit trails and log files, Tecan customers are recommended to use the Backup function and then to archive this information before migration see B.5.8 “Backing Up Files”, B-11).

After archiving, the files can be deleted from the Freedom EVOware directories.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure for storing and transferring data from one operating system to another when operating system versions are changed.

B.7.1.6 § 11.10 (f) Use of Operational System Checks to Enforce Permitted Sequencing of Steps and Events

⌦ Correct sequential operation of the system

Compliance Freedom EVOware

Each Freedom EVOware script is executed using the sequence defined in the script. Each time you insert a new command in the script, Freedom EVOware checks whether the data required by the script (such as information on labware and liquid classes) has already been defined. It validates the entire script to check for errors and shows all commands which have errors in red.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure to verify the correct sequential operation of the system (pipetting sequences and scripts, appropriate instrument operating procedures for each of the tasks which will be carried out).

B.7.1.7 § 11.10 (g) Use of Authority Checks

⌦ Ensure that only authorized individuals can use the system, electronically sign a record, access the operation or computer system, input or output device, alter records or perform other operations

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, B-6.

See B.5.3 “Tecan User Management System”, B-7.

Compliance Tecan Customer

Tecan customers must develop and implement user management procedures for their employees to control access to the Freedom EVOware software and the Microsoft operating system.

21 CFR part 11 rules require the use of procedures and controls to limit access to the system to authorized individuals and the use of authority checks to ensure that only authorized individuals can use the system and carry out specified functions within the system.

B.7.1.8 § 11.10 (h) Use of Device Checks to Determine the Validity of the Source of Data Input

⌦ Device checks

Compliance Freedom EVOware

See B.5.7 “Log Files”, B-11.

Compliance Tecan Customer

Tecan customers must develop and implement a procedure for keeping records of device checks from Freedom EVOware and all of the laboratory equipment involved in the respective activity or process. They must store records of serial numbers, instrument numbers and version numbers of all devices and record any device changes and replacements.

B.7.1.9 § 11.10 (i) Determine that Employees have the Education, Training and Experience to Perform the Assigned Tasks

⌦ Provide evidence that persons who develop, maintain or use electronic record/electronic signature systems have the education, training and experience to perform their assigned tasks

Compliance Freedom EVOware

Tecan ensures that all staff is suitably qualified with respect to their education, job training and experience to perform their assigned tasks.

Compliance Tecan Customer

Tecan customers must ensure that their employees have the necessary education, training and experience to perform the assigned tasks.

For computer security measures to be effective, the users involved in implementing and using them must be trained. This training will need to cover full-time, temporary/part-time and contract staff that use the computers in your organization. It may also need to cover service and maintenance engineers undertaking repairs or modifications to computerized equipment or software.

Furthermore, since technology can provide the means to access applications remotely via a modem or a remote connection, special arrangements may be necessary to minimize the impact that this can have, especially in a regulated environment.

The training should involve using the security measures such as passwords and their maintenance, but also general awareness of computer security issues.

⌦ Job descriptions, training plans, documented training on computerized systems

Compliance Freedom EVOware

Tecan ensures that all Tecan staff is suitably qualified with respect to their education, job training and experience to perform their assigned tasks.

Compliance Tecan Customer

Tecan customers must implement procedures to provide regular user training.

B.7.1.10 § 11.10 (j) Written Policy that Holds Individuals Accountable and Responsible for Their Actions

⌦ Written policy that holds individuals accountable and responsible for actions initiated using their electronic signatures in order to deter record and signature falsification:

Compliance Freedom EVOware

No action required.

Compliance Tecan Customer

Tecan customers must develop and implement a set of policies on employee responsibility and reliability.

B.7.1.11 § 11.10 (k) Use of Appropriate Controls Over Systems Documentation

⌦ Control distribution of, access to and use of system operation and maintenance documentation

Compliance Freedom EVOware

Tecan provides extensive documentation with each software version.

Compliance Tecan Customer

Tecan customers must distribute the supplied software documentation and make it available to all Freedom EVOware users. Tecan customers must implement procedures to provide regular user training.

B.7.2 § 11.30 Controls for Open Systems

§ 11.30 specifies controls for open systems, including the controls required for closed systems in Sec. 11.10 and additional measures such as document encryption and the use of appropriate digital signature standards to ensure record authenticity, integrity and confidentiality.

B.7.2.1 § 11.30 Controls for Open Systems

⌦ Open systems

Compliance Freedom EVOware

This is not applicable to Freedom EVOware. Freedom EVOware is intended for a closed system and not designed for an open system.

Compliance Tecan Customer

No action required.

B.7.3 § 11.50 Signature Manifestations

§ 11.50 requires signature manifestations to contain information associated with the signing of electronic records. This information must include the printed name of the signer, the date and time when the signature was executed and the meaning (such as review, approval, responsibility and authorship) associated with the signature. In addition, this information is subject to the same controls as electronic records and must be included in any human readable forms of the electronic record (such as electronic display or printout).

B.7.3.1 § 11.50 (a) Signature Manifestation

⌦ Signed electronic records

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, 🗎 B-6.

See B.5.5 “Electronic Signatures”, 🗎 B-9.

Compliance Tecan Customer

See B.4.1 “Assigning and Using Freedom EVOware User Names”, 🗎 B-6.

B.7.3.2 § 11.50 (a) Printed Name of Signer

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, 🗎 B-6.

See B.5.5 “Electronic Signatures”, 🗎 B-9.

Compliance Tecan Customer

See B.4.1 “Assigning and Using Freedom EVOware User Names”, 🗎 B-6.

B.7.3.3 § 11.50 (a) Date and Time of Signature

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, 🗎 B-6.

See B.5.5 “Electronic Signatures”, 🗎 B-9.

Compliance Tecan Customer

No action required.

B.7.3.4 § 11.50(a) Meaning Associated with Signature

Compliance Freedom EVOware

See B.5.5 “Electronic Signatures”, 🗎 B-9.

Compliance Tecan Customer

No action required.

B.7.4 § 11.70 Signature/ Record Linking

§ 11.70 requires that electronic signatures and handwritten signatures executed on electronic records must be linked to their respective records to ensure that signatures cannot be excised, copied or otherwise transferred to falsify an electronic record by ordinary means.

⌦ User-specific log on in case more than one person works on a system

Compliance Freedom EVOware

Freedom EVOware does not allow more than one person to use the software simultaneously.

Users can log out without leaving Freedom EVOware or interrupting a running pipetting script. The same or a different user can then log in to Freedom EVOware again while the script is still running. See 6.1.9 “Lock EVOware”, 🗎 6-7.

Users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected.

Compliance Tecan Customer

Tecan customers must instruct their employees not to share their user name and password combinations with other employees, and to log out before allowing another employee to use Freedom EVOware or if they plan to leave the running system unattended (see 6.1.9 “Lock EVOware”, 🗎 6-7).

⌦ Specify measures to prevent violation of the signature uniqueness

Compliance Freedom EVOware

Freedom EVOware is a closed system and access to Freedom EVOware uses a combination of user name and password for unique identification. Freedom EVOware cannot be used without a valid user name and password.

Freedom EVOware does not allow more than one person to use the software simultaneously.

If an attempt is made to copy a signature from one file to another, this is detected by Freedom EVOware’s CRC checksum feature.

See B.5.1 “Closed Systems”, 🗎 B-6.

See B.5.5 “Electronic Signatures”, 🗎 B-9.

Compliance Tecan Customer

See B.4.1 “Assigning and Using Freedom EVOware User Names”, 🗎 B-6.

⌦ User-specific automated inactivity time out in case more than one person works on a single system

Compliance Freedom EVOware

Freedom EVOware does not allow more than one person to use the software simultaneously.

Users are automatically logged out after a specified time during which no keyboard or mouse-click activities have been detected.

Compliance Tecan Customer
No action required.

B.8 Part C - Electronic Signatures

B.8.1 § 11.100 General Requirements

§ 11.100 requires that each electronic signature must be unique to one individual and must not be reused by or reassigned to anyone else. Before an organization establishes, assigns, certifies or otherwise sanctions an individual's electronic signature, the organization must verify the identity of the individual.

B.8.1.1 § 11.100 (a) Uniqueness

⌧ Uniqueness of electronic signatures

Compliance Freedom EVOware
See B.5.1 “Closed Systems”, B-6.
See B.5.5 “Electronic Signatures”, B-9.

Compliance Tecan Customer
See B.4.1 “Assigning and Using Freedom EVOware User Names”, B-6.

⌧ Procedures and controls to make sure that electronic signatures are never reassigned to anyone else

Compliance Freedom EVOware
See B.5.3 “Tecan User Management System”, B-7.

Compliance Tecan Customer
See B.4.1 “Assigning and Using Freedom EVOware User Names”, B-6.

B.8.1.2 § 11.100 (b) Verify Identity

⌧ Verify the identity of an individual

Compliance Freedom EVOware
Freedom EVOware is a closed system and access to Freedom EVOware uses a combination of user name and password for unique identification. Freedom EVOware cannot be used without a valid user name and password. Also see B.5.3 “Tecan User Management System”, B-7.

Compliance Tecan Customer
See B.4.1 “Assigning and Using Freedom EVOware User Names”, B-6.

B.8.1.3 § 11.100 (c) Legally Binding Signature

⌦ Persons using electronic signatures verify it as the legally binding equivalent of the handwritten signature

Compliance Freedom EVOware

Freedom EVOware is a closed system and access to Freedom EVOware uses a combination of user name and password for unique identification. Freedom EVOware cannot be used without a valid user name and password. Also see B.5.3 “Tecan User Management System”, B-7.

Compliance Tecan Customer

See B.4.1 “Assigning and Using Freedom EVOware User Names”, B-6.

B.8.2 § 11.200 Electronic Signature Components and Controls

§ 11.200 requires that electronic signatures not based on biometrics must employ at least two distinct identification components such as a name and password. In addition, when an individual executes a series of signings during a single period of controlled system access, the first signing must be executed using all electronic signature components and the subsequent signings must be executed using at least one component designed to be used only by that individual. When an individual executes one or more signings not performed during a single period of controlled system access, each signing must be executed using all of the electronic signature components. Electronic signatures not based on biometrics are also required to be used only by their genuine owners and administered and executed to ensure that attempted use of an individual's electronic signature by anyone else requires the collaboration of two or more individuals. This would make it more difficult for anyone to forge an electronic signature. Electronic signatures based upon biometrics must be designed to ensure that such signatures cannot be used by anyone other than the genuine owners.

B.8.2.1 § 11.200(a) Non-biometric Signatures

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, B-6.

Compliance Tecan Customer

Tecan customers must follow their company rules for using non-biometric signatures.

B.8.2.2 § 11.200(a) Employ At Least Two Distinct Identifications

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, B-6.

Compliance Tecan Customer

No action required.

B.8.2.3 § 11.200(a) Series of Signings During Continuous System Access

Compliance Freedom EVOware

Freedom EVOware requires the user to log in with name and password at startup (first signing). For each following signing only entry of the user’s password is required.

See B.5.5 “Electronic Signatures”, B-9.

Compliance Tecan Customer

No action required.

B.8.2.4 § 11.200(a) Signing During Non-continuous System Access

Compliance Freedom EVOware

Freedom EVOware requires the user to login with user name and password when signings are performed during non-continuous system access.

- When closing Freedom EVOware and starting the software again.
- When actively logging out of Freedom EVOware without closing the program.
- When automatically being logged out of Freedom EVOware after the defined idle time.

Compliance Tecan Customer

No action required.

B.8.2.5 § 11.200(a) Genuine Owner of Signature

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, B-6.

Compliance Tecan Customer

See B.4.1 “Assigning and Using Freedom EVOware User Names”, B-6.

B.8.2.6 § 11.200(a) Administered Signature

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, B-6.

Compliance Tecan Customer

See B.4.1 “Assigning and Using Freedom EVOware User Names”, B-6.

B.8.2.7 § 11.200(b) Biometric Signatures

Compliance Freedom EVOware

Freedom EVOware does not use biometric signatures.

Compliance Tecan Customer

Not applicable.

B.8.3 § 11.300 Controls for Identification Codes and Passwords

§ 11.300 describe that electronic signatures based upon the use of identification codes in combination with passwords must use controls to ensure security and integrity.

B.8.3.1 § 11.300(a) Maintaining Uniqueness

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, B-6.

See B.5.3 “Tecan User Management System”, B-7.

Compliance Tecan Customer

See B.4.1 “Assigning and Using Freedom EVOware User Names”, B-6.

B.8.3.2 § 11.300(b) Check Identification

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, B-6.

See B.5.3 “Tecan User Management System”, B-7.

Compliance Tecan Customer

See B.4.1 “Assigning and Using Freedom EVOware User Names”, B-6.

B.8.3.3 § 11.300(c) Loss Management

Compliance Freedom EVOware

This section is not applicable to Freedom EVOware since the Tecan User Management system does not use tokens, cards or other devices to bear or generate identification codes.

Compliance Tecan Customer

No action required.

B.8.3.4 § 11.300(d) Prevent Unauthorized Use

Compliance Freedom EVOware

See B.5.1 “Closed Systems”, B-6.

See B.5.3 “Tecan User Management System”, B-7.

Compliance Tecan Customer

Tecan customers must develop and implement procedures to disable the user name and password when an employee leaves the company.

Tecan customers must name an authority that should be notified if an attempt is made to get unauthorized access to the system.

As part of the regular system maintenance activities, the Freedom EVOware Administrator should routinely and regularly check the Freedom EVOware log files for attempts get unauthorized access to the system. In addition, it is recommended to enable the feature in the Tecan User Management system to automatically notify a specified person by email if an attempt is made to get unauthorized access.

B.8.3.5 § 11.300(e) Periodic Testing

Compliance Freedom EVOware

This section is not applicable to Freedom EVOware since the Tecan User Management system does not use tokens, cards or other devices to bear or generate identification codes.

Compliance Tecan Customer

Not applicable.

B.9 Freedom EVOware Installation Checklist

This section contains a checklist of the major tasks that need to be carried out to help the system to become compliant with the 21 CFR Part 11 regulations. It is divided into things that need to be done before, during and after installation of the software.

B.9.1 Before Installing Freedom EVOware

Designate an experienced system administrator to set up the PC and the PC network.

The system administrator must develop a secure and effective way of remembering his or her password.

If you plan to install Freedom EVOware in a network environment (LAN), take appropriate configuration steps when installing the Microsoft operating system and the network server(s).

If you plan to store Freedom EVOware data on a network, you must assign appropriate access privileges to the network directories.

Archive and clear existing Microsoft Application, Security and System logs.

For network domain servers, disable the Guest account.

For network domain users, set the same account policies as on the local PCs:

- Set the “Enforce password history” password policy to “12 passwords remembered”.
- Set the “Maximum password age” password policy to 30 days.
- Set the “Minimum password age” password policy to 5 days.
- Set the “Minimum password length” password policy to 5 characters.
- Set the “Account lockout threshold” account lockout policy to 3 invalid logon attempts.

Activate password-protected screen savers.

B.9.2 Installing Freedom EVOware

Install the Freedom EVOware software according to the installation instructions supplied with the software. In some countries, the Freedom EVOware software must be installed by an authorized Tecan Field Service Engineer. Contact your local Tecan distributor for more information.

B.9.3 After Installing Freedom EVOware

Ensure that the Microsoft Application, Security and System logs are set to “Do not overwrite events (clear log manually)”.

Increase the default size for the Microsoft Application, Security and System logs.

Ensure that the following procedures are implemented to address sections of the 21 CFR Part 11 regulations, including (but not necessarily limited to):

- Provide suitable education, training and practical experience to personnel.
- Ensure that individuals are held accountable and responsible for their actions when using the pipetting system and the Freedom EVOware software.
- Verify the identity of each individual who is permitted to work with Freedom EVOware.
- Create separate Freedom EVOware user accounts using the Tecan User Management system for all persons who are authorized to use Freedom EVOware.
- Create separate PC and/or PC network user accounts using standard Microsoft tools and procedures for all persons who are authorized to use Freedom EVOware.
- Implement appropriate controls over distribution, use of and access to data and log files.

- Configure the log file functions in the Freedom EVOware settings to document the pipetting and to record user inputs.
- Implement systems to prevent and detect unauthorized modification of data and log files.
- Notify the FDA that electronic signatures are intended to be equivalent to handwritten signatures.

Ensure that the following steps are also carried out:

- Regularly archive and clear the Microsoft Application, Security and System logs.
- Regularly check the Microsoft Security log to detect unauthorized access to the PC.
- Ensure that users are logged out from Freedom EVOware when the PC is unattended.

C Validation of Freedom EVOware Applications

All Freedom EVOware scripts and processes must be validated for correct functioning and for correct results before they are used for pipetting with real samples. It is recommended to test run the script or process to make sure that it operates as intended. This chapter gives an overview of some of the more important points which must be checked. See also 2.8.2 “General Rules When Using the Pipetting Instrument”, 2-6.
The following list of points to check when validating is not intended to be exhaustive and does not replace any local laws or statutes that apply.

C.1 Important Points to Check When Validating Freedom EVOware Applications

- When Freedom EVOware is first started, check the log file for errors. If error messages are found, the cause of the error must be remedied before you start pipetting.
- If you intend to use Freedom EVOware to control a pipetting instrument, make sure that the operation mode which is shown in the status bar is REAL MODE. If you intend to use Freedom EVOware to simulate a script or process, e.g. for the purpose of testing, make sure that the operation mode which is shown in the status bar is OFFLINE. Pipetting does not take place in offline mode. See 6.7.3 “Status Bar”, 6-20.
- Make sure that you have loaded the correct script or process for the assigned pipetting task.
- Check the script editor window for errors (commands which have errors are shown in red). In Freedom EVOware Plus, check all of the scripts in your process for errors. For example, script errors will be shown if:
  - The hardware configuration or the LiHa configuration of the pipetting instrument does not meet the requirements of the script or process.
  - Liquid classes required by the script or process are missing.
  - RoMa or PnP movement vectors required by the script or process are missing.
  - See also 11.4.2.1 “Checking the Pipetting Script for Errors”, 11-5.
- Check the liquid containers and system liquid of the pipetting instrument for the correct liquid types and concentrations which are required by the script or process.
- Before running the script or process, you must set up the worktable with the carriers, labware and devices which are needed by the application or assay. The administrator or owner of the pipetting instrument must establish standard operating procedures for setting up the worktable and make them available to everyone who carries out pipetting.
- After setting up the worktable with the carriers, labware and devices which are needed by the application or assay, inspect the paths that the instrument arms (LiHa, RoMa, PnP) will take during the hardware initialization sequence to make sure that there are no obstacles which could obstruct the movements. See also 8.4.2.8 “Arm Initialization”, 8-31.
- Manually initialize the arms of the pipetting instrument (e.g. using the Initialize button in the Freedom EVOware toolbar), make a visual check that the initialization sequence has been carried out correctly and check the log file for

initialization errors. If error messages are found, the cause of the error must be remedied before you start pipetting.

- Before you pipette using real samples, test run the script or process to make sure that:
  - Pipetting takes place at the intended positions on the worktable (e.g. correct microplate, correct well).
  - The correct volumes of liquid are pipetted.
  - Pipetting takes place in the correct sequence as required by the application.
- Freedom EVOware chooses multi-dispensing mode automatically if the pipetting script specifies an aspirate command followed by several consecutive dispense commands. In turn, this influences the liquid class parameters which are used. The decision between single dispensing mode and multi-dispensing mode is made when the script is validated and not when the script is run. Scripts are validated when they are modified and also when they are opened for running without being modified. Validation is done using default values for the variables (see 11.4.2.1 “Checking the Pipetting Script for Errors”, 11-5).
  If the number of consecutive dispense commands is controlled by a variable whose value can change during runtime, it is recommended to design the script with branches or separate groups of commands for single-pipetting mode (one dispense operation) and multi-pipetting mode (more than one dispense operation). This ensures that the correct pipetting mode and liquid class parameters will be chosen at runtime.
- If your script or process uses liquid level detection (e.g. the chosen liquid class uses liquid level detection or the script or process uses the Detect Liquid command), make sure that liquid detection is working correctly. The capacitive detection system is not suitable for all liquid types (e.g. liquids with foam, non-conductive liquids). Liquid detection can not be used if you are using septum piercing. To ensure accurate liquid detection, make sure that the labware is correctly seated on the carriers.
- If your script or process sends firmware commands to the pipetting instrument or to other devices, make sure that the correct firmware commands have been specified and that they initiate the intended actions. Sending the wrong commands can cause invalid results, damage the instrument or objects in its workspace, hurt yourself or other people and can cause the script or process to produce invalid results.
- If your script or process uses a microplate reader, check the results (output data) from the reader to make sure that they are plausible.
- When setting up an assay for a liquid which can clot, make sure that clot detection is enabled in the liquid classes which are used to handle the liquid. Refer to the Good Usage information in the Operating Manual for the pipetting instrument for additional recommendations.
- When setting up an assay which uses a trough (container for a reagent liquid), make sure that the liquid classes which are used for aspirating from the trough are configured to immerse the tips in the liquid by at least 3 mm.
- Appropriate tip washing actions must be provided in the script or process to avoid cross-contamination of samples and/or reagents. Disposable tips can also be used to avoid cross-contamination of samples and/or reagents. Design and test run the script or process to make sure that cross-contamination will not take place.
- If your script or process uses a shaker, make sure that the shaker parameters (e.g. shaking time, shaking frequency) have been configured correctly and that the shaker operates as intended.

- If your script or process uses an incubator, make sure that the incubator parameters (e.g. incubating time and temperature) have been configured correctly and that the incubator operates as intended.
- If your script or process uses devices with heating elements (e.g. shaker, heated incubator, some microplate readers), make sure that the script or process allows enough time for the heater to heat up to or cool down to the intended temperature before it is used. Test run the script or process and measure the temperature which has been achieved.
- If your script or process uses operations where timing is critical (e.g. incubator, shaker), make sure that the timing and delays have been configured correctly and work as intended:
  - Check the time specified in the respective device command.
  - Check the time specified in Wait For Timer commands.
  - In Freedom EVOware Plus, check that the sum of execution time and maximum waiting time (as specified in the process step) meets the requirements of the script or process. For example, if an incubation process step needs to wait for another operation to finish, the incubation time must still lie within the limits which are acceptable to the application. If necessary, adjust the specified maximum waiting time and test the application again.
- If the system pauses for any reason when running a script or process, the duration of the pipetting script, process step or procedure may differ from the intended time. For example, sample incubation time may be outside of the specified limits. Depending on the application, this can make the assay invalid.
  - A system pause can be caused e.g. by clicking the Pause button in Freedom EVOware's Runtime Controller dialog box, by pressing the Pause button on the pipetting instrument, by a pipetting error or by an internal timeout if a process step has taken longer than expected or specified.
  - System pauses are not shown in the Gantt chart in the Extended View of the Runtime Controller (the Gantt chart is only available in Freedom EVOware Plus).
- If your script or process uses eMail for notification of important events, the notification function must be used to send a test eMail to make sure that the eMail is sent correctly and is received by the intended recipient.
- If your script or process imports required information from external files (barcode lists, lists of values for variables etc.):
  - Make sure that the correct filename has been specified in the script or process.
  - Make sure that the import file exists and contains the intended data.
- Check that the script or process starts to run as intended when you click the Start button in the Runtime Controller
- When the script or process has completed, check the status information and the Warnings / Errors window in the extended view of the Runtime Controller and check all log files to make sure that the entire script or process has completed and that there are no error messages.
- The results of an assay are only valid if the entire script or process completed without errors. If this is not the case, the entire script or process must repeated after rectifying the cause of the error(s).

C.2 Setting the Validation Status of Scripts and Processes

Freedom EVOware allows you to hide non-validated scripts and processes from users with the access level *Operator* to ensure that they cannot use them. This optional feature must be activated in the Configuration Tool (see 8.3.3.1 “Settings Tab”, 🗎 8-17, Enable file validation).

If you activate this feature, non-validated scripts, processes and templates are shown to Freedom EVOware Administrators and Application Specialists in the Selection dialog box with a gray icon instead of a colored icon (they are not visible at all to Operators).

After validating a script or process (see C.1 “Important Points to Check When Validating Freedom EVOware Applications”, 🗎 C-1), proceed as follows to set it's file status to Approved (you need Administrator or Application Specialist access rights to do this):

- In the main window of Freedom EVOware, click Open in the Toolbar or choose Open in the File menu.
- In the Selection dialog box, right click the script (Freedom EVOware Standard) or process (Freedom EVOware Plus) and choose *Validate* from the context menu.

Proceed as follows to revoke the Validated status (you need Administrator or Application Specialist access rights to do this).

- Right click a validated script or process and choose *Remove Validation* from the context menu.

C.3 Recommendations when using barcodes

If your script or process uses a barcode scanner:

- Check the results (output data) from the barcode scanner to make sure that they are plausible.
- Make a visual check of the barcode scanning process to make sure that the correct barcode label is scanned (if the labware, carrier or tube has more than one label) and that the barcode scanner scans across the center of the label (physical alignment).
- The barcodes must be accurately aligned - both horizontally and vertically - on all labware, tubes and containers. For more information see the Operating Manual of the pipetting instrument (refer to the section on Barcode Positioning).

To ensure good reading results, pay attention to the following recommendations:

- The quality of the barcode labels should be grade A according to ANSI X3.182 and DIN EN 1635. The identification of grade B and C barcode labels is possible but the barcode scanner manufacturer's performance specifications cannot be guaranteed in this case.
- Do not use yellowed, stained, creased, wet or damaged barcode labels.
- The adhesive labels must be flat and not peeling off at the edges.
- Use barcodes printed by a thermal-transfer or photographic quality printer (not a dot-matrix printer).
- Use a barcode testing device to verify the barcode quality.
- The barcode label surface must be clean.
- We recommend you to ensure the quality of the barcodes by implementing a local SOP (Standard Operating Procedure).

Note: *For more information see the Operating Manual of the pipetting instrument (refer to the sections on Barcode Quality and Barcode Positioning).*

- Barcodes for carriers (e.g. microplate carriers and tube racks) contain information on the carrier type. The carrier type is coded in the first three digits of the barcode and is also shown in the Edit Carrier dialog box. Freedom EVOware will output an error during script or process runtime if the carrier type indicated by the PosID/PosID-3 barcode scanner does not match the type which you have used in the worktable definition.
- For (custom) tube racks, make sure that the barcode which is fitted is appropriate for the tube rack type. The carrier (tube rack) type is coded in the first three digits of the barcode and is also shown in the Edit Carrier dialog box. Do not use the wrong tube size in the tube rack (e.g. do not use 13 mm tubes in a tube rack which is intended for 16 mm tubes). This will cause scanning and pipetting errors. The PosID/PosID-3 calculates the expected position of the tube barcodes according to the tube rack type which is shown on the tube rack barcode.

In the settings for the PosID (or PosID-3) command:

- Only choose the barcode types which are used on the barcode labels. This makes it easier for the scanner to identify incorrect barcodes.
- If the barcode type you are using has start and stop characters, they must be activated in the settings.
- If the barcode type you are using has a checksum (check digit), it must be activated in the settings.
- If the barcode type you are using does not have a checksum, you must always specify the actual number of barcode characters used (do not specify 0).

Notes on specific barcode types:

- **Codabar:** You must always specify the actual number of barcode characters used (do not specify 0) and you must always use a check digit (modulo 16). This barcode type is not recommended due to reading security.
- **Code 128:** This barcode type always has a check digit - you do not need to activate the checksum in the PosID/PosID-3 command explicitly. This barcode type is widely used and has good reading security (and used by Tecan for carrier barcodes).
- **Interleaved 2 of 5:** You must always specify the actual number of barcode characters used (do not specify 0) and you must always use a check digit (modulo 10). The number of characters is always even for this barcode type. The barcode should have at least 6 characters. This barcode type should not be used due to reading security.
- **Code 39 Full ASCII:** Only use with a check digit (modulo 43).
- **Code 39:** Only use with a check digit (modulo 43).
- **EAN-128:** This barcode type is a special version of Code 128 which is often used for commercial and industrial applications. It always has a check digit - you do not need to activate the checksum in the PosID/PosID-3 command explicitly. It is limited to numeric data and has good reading security.

Only use barcodes with a specified length and a checksum (check digits) for general purpose pipetting applications. This ensures that incorrectly scanned barcodes are always detected.

D Glossary

Purpose of This Chapter

This chapter consists of two parts:

- The first part (section D.1 “Glossary of Terms and Instrument Options”, D-1) explains a number of important terms which are used in this manual. The terms are listed in alphabetical order.
- The second part (section D.2 “Important GUI features in MS Windows Applications”, D-27) explains the most common Windows controls you will encounter in many screens, dialog boxes, message boxes and forms shown in this manual.

D.1 Glossary of Terms and Instrument Options

This section provides an explanation of important terms which are used in this manual and describes some of the more common options for Tecan pipetting instruments. Contact Tecan for information on the options which are available for the pipetting instrument version and pipetting software version that you are using.

3-way valve box

The 3-way valve box is a component of the Te-Flow option, which provides support for the In Situ Hybridization method.

6-way valve

The ChemSystem option includes a 6-way valve to allow you to switch between six different system liquids. A 6-way valve is also available for the → **Te-Fill option**. It allows you to switch between six different liquid containers.

<base>

Placeholder which represents the original location of the object (the labware source).

<install_path>

Placeholder which is used in this manual to represent the installation path of the Freedom EVOware software. The default installation directory of Freedom EVOware is C:\Program Files\Tecan\EVOware. You may decide to choose another directory when you install the software. The installation path is also dependent on the language version of your operating system.

<none>

Placeholder to indicate that the parameter is unused (e.g. if you want to execute a plate robot movement command without using the barcode scanner).

<object>

Placeholder to indicate an object (typically a plate lid or plate insert).

Active Positioning Carrier (APC)

Carrier fitted with an electromagnetic clamping device which is used to hold microplates and align them precisely.

Active WashStation

The Active WashStation is an instrument option which is used for washing Active Tips and ZipTips. It is provided with a pressure pump and a waste container. Note: Active Tips are no longer supported by Freedom EVOware.

ActiveTip

An Active Tip is an electrically activated tip which dispenses very small quantities of liquid down to 0.5 nl (nano liters). Active tips are equipped with a micro pump and a piezo-actuated pump chamber.

With Active Tips, dispensing is metered by the micropump rather than by the dilutor. The droplet volume depends on the electrical drive parameters (voltage, frequency and pulse width). Each Active Tip is individually tested and is supplied with its own drive parameters which are required for proper functioning.

Active Tips are a component of the Tecan Nanopipetting System (NPS). Active Tips are no longer supported by Freedom EVOware. For other tip types → **Tip**.

Airgaps

Airgaps are necessary for separation of different liquid segments inside tubing and tips. In order to avoid disintegration, airgaps should be kept below 30 µl. For the same reason, the airgap aspiration speed should not exceed 70 µl/second.

Aquarius

The Aquarius is a compact robot pipetting instrument which is supplied with its own pipetting software. Many of the Aquarius functions are similar to those of the Te-MO 3/3 (Tecan Multi-Pipetting Option), which is an option for the Freedom EVO series of pipetting instruments. Aquarius is equipped with a specially designed pipetting system which can pipette up to 384 wells simultaneously, resulting in an extremely high throughput and efficiency. With the Aquarius instrument, the same volume is pipetted by all of the tips.

Aspiration speed

In general, a decrease of the aspiration speed will increase precision and accuracy. Very low aspiration speeds (30-70 µl/second) are required when pipetting small volumes (< 25 µl) or when pipetting liquids with high viscosity or low boiling point. Liquids with a viscosity higher than that of water may also require an aspiration delay.

ASTM interface

ASTM (American Society for Testing and Materials) is a leading US standards institute. In the context of this manual, ASTM interface refers to a standard for transferring information between clinical instruments and computer systems through a serial (RS232) connection. The ASTM interface protocol is specified in the two ASTM documents E1381 and E1394. Although this standard has now been superseded by other standards from ANSI/NCCLS, it is widely used in laboratories for transferring data to and from laboratory information management systems (LIMS).

Autoloader

The Autoloader is an optional plate feeder and storage system for → **Aquarius** pipetting instruments. The Autoloader, which is installed on the right side of the Aquarius, is provided with six stacker columns. Each stacker column can accommodate up to 50 pieces of labware.

Calibration volume

Use of the Calibration tool requires knowledge of the actual absolute pipetting volume error.

CAN bus (Controller Area Network)

High-speed data bus which is used internally by Tecan pipetting instruments for interconnecting devices such as the → **Liquid Handling Arm**.

Carousel

The carousel is a motor-driven magazine system which is used to store microplates, tube racks or DITI racks and to present them to the instrument for pipetting operations. Each carousel can have 1 to 9 towers. The labware is removed from the carousel and re-inserted using the → **RoMa**. The carousel can be fitted with a barcode scanner which can read barcode labels on plates when they are inserted and removed. The carousel can be used like any other microplate hotel on your pipetting instrument.

The Carousel NT supersedes the standard carousel and features a number of electrical and mechanical improvements, including faster operation and safety doors which can be fitted with doorlocks.

Carrier

A carrier is a removable support or mount on the instrument's worktable (i.e. deck) which holds one or more pieces of labware in place. Carriers can be fitted to the instrument's worktable at pre-defined grid positions (see Fig. 11-8, 11-20).

In Freedom EVOware, carriers are also used to represent positions on devices which can be accessed by the plate or tube robot. For example, the plate robot can put a microplate onto the shuttle of the Te-Stack stacker when the shuttle is at the transfer position.

The carrier name indicates the labware type for which it is designed (for device carriers, it indicates the device type).

Carrier code

Code which indicates the carrier type. This is the first three digits of the barcode at the end of the carrier. All standard Tecan carriers and tube racks have a unique carrier code.

Carrier unit

→ **Grid Unit**.

Carry over

Residue of sample liquid that remains in a tip after rinsing at the end of a pipetting cycle. Such residue is "carried over" to the next cycle and could cause contamination. Where no carry over is admissible, → **DiTis (Disposable tips)** must be used.

Cellerity, CellGEM

Tecan Cellerity is a modular system based on the Freedom EVO series of pipetting instruments which allows you to automate typical cell biology processes for adherent cell lines such as cell feeding, harvesting and passaging. CellGEM is the Tecan application software for the Cellerity system.

CGM (Common Gripper Module)

The CGM is a robot arm with gripper fingers that can grip and move objects such as microplates. It is a hardware option for the → **MCA384** (Multi Channel Arm 384).

ChemSystem

An option which allows you to use up to 6 different system liquids in the pipetting instrument. It consists of a 6-way valve to select the required system liquid, a nitrogen valve and the vacuum assisted waste option.

Cleaner position

Part of a wash station into which the tips are placed to wash the outside of the tips using the system liquid. The used liquid then flows off through the waste tubing into the waste container. → **Waste position**.

Clot detection

Two different technologies are available for the Freedom EVO pipetting instrument series to detect clots which have been aspirated by the pipetting tips: capacitive and pressure-based. The capacitive method is always available and the pressure-based method is optional.

With **capacitive clot detection**, a message is output if the difference between the liquid levels measured before and after sample aspiration does not correspond to the calculated level difference, indicating that clots are attached to the tip. Capacitive clot detection is only available if capacitive liquid level detection has been activated in the liquid class.

Capacitive liquid level detection (cLLD) works in both directions, i.e. when the tip is moved into a liquid and when it is retracted again. This allows detection of aspirated clots, e.g. blood clots. The software stores the height at which the tip enters the liquid. The volume aspirated and the container or tube diameter are known. The software can then calculate the height at which the tip should leave the liquid again when it is retracted. If the exit height is too high, it can be assumed that a clot is hanging from the tip. See also 10.2.1 “LiHa Aspirate Parameters (Fixed Tips and DiTis)”, 10-7, *Use exit signal detection.*

With **pressure-based clot detection**, a message is output if abnormal presssure values are detected in the pipetting tip when aspirating, indicating the presence of a clot or tip blockage. Pressure-based clot detection requires the → **Pressure Monitored Pipetting (PMP)** hardware option. PMP is only available for LiHa DITI tips.

Compartment (of well)

Some special labware types (e.g. for protein crystallography) have wells with several compartments (cavities). Freedom EVOware can pipette a different liquid into each of the compartments. Each well typically has one main compartment and one or more satellite compartments which are directly adjacent and are often smaller in size.

Columbus washer

The Columbus Washer is used for stripwise washing of 96-well microplates (optional: 384-well microplates). It can be equipped with either a 8, 12 or 16 way manifold or a 384 way manifold, each of which are provided with one aspirating and one dispensing needle per well. It can store up to 9 user-defined labware types that define the dispensing and aspirating positions for round or flat bottomed plates. The dispensing and aspirating speeds can be selected from 5 pre-defined speed settings. For dispensing, an additional drip mode setting is available which allows a wash liquid to be added drop by drop. In the soaking phase, you can also activate a microplate shaking mechanism. These features allow the device to be used for all ELISA microplate washing applications including cell washing.

Command

In Freedom EVOware, script commands are used to specify pipetting operations. A collection of script commands is called a pipetting script. Device commands are used to implement device-specific functions such as washing a microplate in a plate washer. Each device has its own set of commands.

Conditioning volume

Volume of excess liquid that is aspirated together with the liquid to be distributed and immediately discarded (usually in the source container) before the dispense process starts. It serves to create a controlled state of the system. The use of a conditioning volume will help to dispense the first portion of a multi-pipetting distribution under conditions most similar to those of the subsequent portions. This is because the mechanical backlash of the dilutor drive is eliminated after dispensing the conditioning volume.

Configuration

Freedom EVOware stores information on fixed and variable parts of the pipetting instrument in an internal database and a set of configuration files. It also stores information on the dimensions of carriers and labware items and the configuration settings for the optional devices. The Configuration is edited with the Configuration Tool, which is started by clicking *Configure* in Freedom EVOware's toolbar.

Connection box (Te-Flow)

Valve box for use with the Te-Flow option.

Container

Individual well or tube which is used to contain liquid (see Fig. 11-8, 11-20).

CRC (checksum)

Cyclic redundancy check. A method which used to calculate a checksum for files or data. Freedom EVOware uses a CRC checksum to check whether configuration files have been corrupted or modified outside of Freedom EVOware.

CRC Editor

Carrier/Rack/Container editor (part of the Tecan Instrument Software). It is used to edit the CRC database. See 1.2 "Reference Documents", 1-3 for more information.

Deep-well plate

A type of microplate with a capacity of more than 400 µl for each well. Mainly used for pre-dilution and/or for storage of serum.

Detection speed

Speed at which the liquid level is detected. Because liquid level detection is based on measurement of the capacitance, the correct detection speed is dependent on the conductivity of the liquid used as well as on the well geometry. The normally used liquid level detection speed (500-800 mm/s) must be reduced when pipetting small volumes of distilled water or organic solvents.

Device

Single intelligent piece of hardware (such as a plate washer or a robot pipetting arm). It is controlled by Freedom EVOware using a device driver. The device drivers which were chosen during the Freedom EVOware installation are visible in the Worktable Editor and/or in the Control Bar.

Dilutor

Precision pump that aspirates and dispenses exactly defined volumes of liquid by means of motor-driven syringes. The XP 3000 dilutor consists of a syringe pump and a 3-way valve that is connected through flexible tubing to the pipetting tip and a system liquid reservoir. Each tip has its own dilutor.

The XP dilutor supports syringe sizes from 25 µl to 5 ml. The XLP dilutor supports syringe sizes from 50 µl to 50 ml. In addition it has a high resolution mode which allows more accurate pipetting. The XMP dilutor is used by the Freedom EVO 75 pipetting instrument.

Dispense speed/breakoff

The dispense speed never should be set below 250 µl/second to guarantee laminar liquid flow at the tip face and to avoid droplets forming on the tip when dispensing from above the liquid surface. The maximum dispense speed may be limited by foam formation as well as by the shape and size of the destination container. When pipetting very small volumes, the speed of the liquid flow often is limited by the dilutor drive's maximum acceleration.

DiTi (Disposable tip)

Disposable pipetting tip, often made of plastic. DiTis are normally only used for a single aspirate/dispense cycle and are discarded after use. DiTis are used when it is essential that no residues from one sample are carried over to the next → **Carry over**, → **DiTi waste**.

LiHa DiTis are DiTis which are fitted to the liquid handling arm (as opposed to the → **MCA** or → **Te-MO**).

DiTi rack

Rack (also called DITI tray or box) containing disposable tips which can be placed on the worktable to allow the DiTis to be picked up by the → **LiHa**.

Stackable DITI rack: Special DITI rack design which can be stacked using plastic spacers to form a pile of racks. The pile can be put on the workable. This avoids the need for a carousel if the number of DITIs required by your script or process is not too high. The Get DITIs command picks up DITIs from the DITI rack which is on the top of the stack. When the DITI rack is empty, it is removed from the pile together with the spacer to reveal the next DITI rack in the stack. Stackable DITI racks can only be used with the LiHa.

Nested DITIs: Special DITI rack design with 96 DITIs which can be stacked to form a pile of racks. The pile can be put on the worktable or stored in the Te-Stack. When the racks are stacked, the DITI tips slide inside the DITIs on the layer below to save space. Each layer of DITIs has its own rack. Nested DITIs can only be used with the MCA96 or MCA384.

DiTi Waste

Waste chute for collecting used DiTis. → **Lower DITI Eject**.

DMSO

Dimethyl sulfur oxide (reagent).

Dongle

→ **Hardlock**.

Dynamic Link Library (DLL)

A Dynamic Link Library (DLL) is a collection of programs that can be loaded and used while the executable application program (exe) is running. One DLL can be shared by several application programs at the same time.

EEPROM

(Electrically Erasable Programmable Read-Only Memory). Memory chip for non-volatile storage of parameters and/or executable software instructions. Non-volatile means that the data is not lost when the power supply is switched off. An EEPROM behaves like an ordinary → **ROM (Read-Only Memory)** during normal operation. However, an EEPROM can be erased electrically and then re-programmed. For some applications, EEPROMs are now being replaced by → **Flash memory**.

Error handling mode

Identifies the system reaction (e.g., stop instrument and call operator, or aspirate at Z-max, or skip sample, etc.) which is triggered by an error condition.

EVOware

Tecan control and automation software for the Freedom EVO series of pipetting instruments.

Exit signal detection

Exit signal detection (also called dip out signal detection) detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip is retracted and exits the liquid. It is carried out just after aspirating. The measured liquid level is then compared with the liquid level which should have resulted from the aspiration. → **Clot detection**.

See also 10.2.1 “LiHa Aspirate Parameters (Fixed Tips and DiTis)”, 10-7, *Use exit signal detection*.

Freedom EVOware Administrator

System administrator for the Freedom EVOware software.

Excess volume

Used for multi-pipetting mode. Volume of excess liquid that is aspirated together (not separated by an airgap) with the liquid to be distributed. It is not dispensed anywhere, but is discarded to waste (or to a special position) after use. Use of an excess volume ensures that the volume of the last portion of a multi-pipetting distribution is the same as previous portions. To a certain extent, excess volume can also help to prevent the pipetted sample from being diluted by the system liquid.

Exchange position

→ **Transfer position**.

Execution parameters

Device-specific parameters which are used when a device command is executed. They can be configured individually for each process step or script line. To view or edit the execution parameters in Freedom EVOware Plus, double-click on the process step in the Process Editor. To view or edit the execution parameters in Freedom EVOware Standard, double-click on the script command for the device in the Script Editor.

FACTS

Flexible Assay Controller and Task Scheduler. Tecan advanced dynamic scheduling software.

Fast Wash Option (FWO)

The FWO is used to pump a large amount of liquid at high speed through the system, normally to flush the tips. The Fast Wash Option (formerly called FaWa) is included with the → **MPO** (Monitored Pump Option) and the → **SPO** (Sensored Pump Option).

Firmware

Control software residing semi-permanently in an → **EEPROM** or Flash memory. In Tecan pipetting Instruments, firmware is used to control hardware components (motors, pumps, syringes etc.) via the respective control boards. In certain cases it is necessary to download a firmware file from the hard disk to the respective EEPROM. Optional devices such as the PosID barcode scanner are also controlled by firmware.

Firmware command

Combination of machine parameters which instructs the pipetting instrument to perform a specific action such as moving one of the robot arms in a specified direction. The commands must follows the rules and syntax of the instrument’s firmware command set. Firmware commands can also be sent to optional devices such as the PosID barcode scanner. See the respective instrument manual for a list of firmware commands. Also called **Command string**.

Fixed tip

General term for a tip that can be screwed to a pipetting device (e.g. → **LiHa**). Unlike a → **Disposable tip (DiTi)** it is rinsed after each pipetting cycle and can be used again.

FlaskFlipper

The FlaskFlipper hardware option is one of the components of the Tecan Cellerity system. It is mounted on the worktable of the pipetting instrument and is used to load, unload, hold, shake and knock the cell culture flasks.

Flash memory

Memory chip for non-volatile storage of parameters and/or executable software instructions. Non-volatile means that the data is not lost when the power supply is switched off. Flash memory can be erased electrically and then re-programmed.

Flushing the instrument

Procedure that rinses the entire liquid system of the pipetting instrument for the purpose of removing air pockets or exchanging the system liquid. The liquid flows through the dilutors and tubing and exits through the tips into the waste position of the wash station.

Free air dispensing

Dispensing liquid without the tip touching the liquid surface. Free air dispensing is sometimes called jet dispensing. The opposite of free air dispensing is → **Submerged dispensing**.

Freedom

Tecan Freedom pipetting instrument.

Freedom EVO

Tecan pipetting instrument series. Depending on the model, the Freedom EVO can be fitted with up to three robot arms (up to two liquid handling arms, two plate robots and/or two tube robots). It can be interfaced to a wide range of Tecan and third-party laboratory devices such as centrifuges and a laser scanners.

FSE

Tecan Field Service Engineer. The FSE is a specially trained and authorized person who is responsible for installation and initial set up of the Tecan instrument. He or she is also responsible for service and maintenance and should be contacted if there are any problems with the system.

Gemini

Control and automation software for the Tecan Genesis and Genesis Freedom series of pipetting instruments.

Genesis

A series of Tecan pipetting instruments. The Genesis series is fitted with a liquid handling arm (LiHa) and plate and tube robots (RoMa and PnP). It can be interfaced to a wide range of Tecan and third-party laboratory devices such as a centrifuge and a laser scanner.

GENios reader

The Tecan GENios is a fully automatic computer-controlled microplate reader for measuring samples in microplates. It fulfills the requirements for numerous fluorescence, absorbance and glow type luminescence applications in research and routine investigations. It can be used with 384, 96, 24, 12 or 6 well microplates. The filters are arranged in filter slides which allow up to four excitation filters and four emission filters.

GENios Pro reader

The Tecan GENios Pro is a multifunctional microplate reader with injector option. The GENios Pro provides high performance for the vast majority of today's microplate applications and research and is robotic compatible. It supports several measurement techniques such as Fluorescence Intensity (FI), Fluorescence Time Resolved (FTR), Fluorescence Polarization (FP), Flash Fluorescence, Absorbance, Absorbance with Injectors, Glow Type Chemi- or Bioluminescence, Bioluminescence Resonance Energy Transfer (BRET) and Flash Luminescence.

Any common microplate ranging from 6 to 384 well format maybe measured with any of the above measurement techniques. Switching between measurement techniques or labware formats is fully automated via software. It is designed for optimum sensitivity and speed of measurement.

Grid unit

Unit of measurement (25.0 mm, **not** 1 inch) on the worktable of the pipetting instrument. Corresponds to the spacing between the positioning pins in the X direction. Also called → **Carrier unit**.

Grid, grid position

Objects such as carriers are held in place on the instrument's worktable by a grid of positioning pins (clips). This ensures that they are accurately fixed at discrete positions. The positioning pins are spaced 25.0 mm apart in the X direction. Grid position 1 is on the left of the worktable. In Freedom EVOware's Worktable Editor, you can only position objects at grid positions and not in between.

GUI

Graphical User Interface (of a computer program).

Hardlock

Software copy protection device (dongle) which is plugged into the USB port of your PC. Different hardlock versions enable different Freedom EVOware software feature levels (see 3.1.2 "Hardlocks for Freedom EVOware Standard and Freedom EVOware Plus", 3-2).

Heating block

Component incorporated in options like Te-MagS, Te-Shake or the Incubation Device that is used to heat up samples and to keep them at a defined temperature.

Hettich centrifuge

Centrifuging device from the Hettich company which is fitted below the worktable and secured to the floor. It can be loaded and unloaded by reaching through a hole in the worktable with a robot. It can perform centrifuging of samples at configurable speeds and temperatures.

Hit-Picking Wizard

The Hit-Picking Wizard is a software add-on for Freedom EVOware. It creates a pipetting script which picks samples from source labware and dispenses them into destination plates according to a configurable destination plate layout (dispense map). A "sample list" file (input file) specifies the location of the samples you want to process.

Hotel (RoMa hotel)

Device (e.g. arrangement of shelves) which is used to store (i.e. park) objects such as labware which can then be picked up by the RoMa for placing on carriers. Hotels are normally put at the rear of the worktable.

Hydroflex Software

Tecan control software and driver system which is used by certain Tecan plate washer models. The Hydroflex software, which must be installed separately, installs it's own commands for the washer in the Freedom EVOware Control Bar. Refer to the Hydroflex and/or washer documentation for information on using the commands within Freedom EVOware scripts and processes.

ILID

Integrated **LI**quid **D**etector. Electronic device mounted on the liquid handling (LiHa) arm. The ILID monitors the capacitance between the pipetting tip and electrical ground (worktable) and generates a signal when there is a sudden change in capacitance caused by the pipetting tip coming in and out of contact with an ionic solution. The signal is used for liquid and clot detection.

Incubator

An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place.

A heated incubator incorporates a → **Heating Block** and a control circuit and can be fitted with a shaker option.

A Room Temperature Incubator provides a location where labware can be kept at room temperature.

The Base Incubator treats the base (labware source) location of a piece of labware as a room temperature incubator. The labware is taken back to its base position and left there for a specified length of time. In Freedom EVOware, the base incubator is a software concept. It is not a device which you can fit to your pipetting instrument.

See also → **Te-Thermix.**

Initialization

Term used to describe the calibration of one or more axes of the pipetting instrument. This is done by moving the instrument arms etc. to predefined positions. When initializing the dilutors, the LiHa is moved over the Wash Station (if it is defined on the worktable) to avoid liquid dripping onto the instrument deck. The pipetting instrument uses an absolute coordinate system that requires X/Y/Z calibration.

Instance of a process

To achieve the maximum throughput (efficiency) of the pipetting instrument, for example the maximum number of processed microplates per hour, Freedom EVOware Plus allows you to run several copies of the same process in parallel. This allows Freedom EVOware Plus e.g. to fetch a microplate from the carousel while pipetting is taking place on another microplate. Each copy of the process is called an instance (or "iteration"). The number of process copies you want to run is chosen in the Runtime Controller when you run the process. Each process instance is given a unique number (the process instance ID, counting from 1).

Instrument (pipetting instrument)

A number of devices which work together. One of the devices is normally a robot pipetting arm. Other devices can be e.g. a centrifuge, a plate washer or a barcode scanner, depending on the requirements of your application or experiment. Pipetting instrument are normally provided with a → **Worktable** (deck).

Instrument step

Smallest unit of movement for the servo motors of the pipetting instrument (0.1 mm).

ISH

In Situ Hybridization method, requires the Te-Flow option.

Labware

Disposable item such as a microplate or a sample tube. Microplates have a regular arrangement of containers or cavities (wells) for holding liquid samples or reagents (see Fig. 11-8, 11-20). During pipetting, microplates are normally placed on carriers. Tubes are inserted into tube racks or strip racks. The carriers and racks are placed on the worktable of the pipetting instrument at pre-defined positions.

LICOS

Liquid Container Supervisor. The LICOS option is a device which monitors the liquid level in the waste liquid and system liquid containers. It outputs a warning if the waste container is nearly full or if the system liquid container is nearly empty. LICOS is included with the Monitored Pump Option (MPO).

LiHa (Liquid handling arm)

Robot arm on the pipetting instrument which is mounted on the X-slide and typically holds four or eight pipetting tips. It is used for pipetting samples in different volume ranges, depending on the tip types used and the features of the liquid system.

Liquid arrival check

The Liquid Arrival Check (LAC) feature verifies that the correct liquid volumes have been dispensed by weighing the labware before and after pipetting. The labware must be put onto a special balance (pooling balance) for the dispense operation. Freedom EVOware automatically calculates the liquid volume from the weight difference and compares the results with the volume specified in the pipetting command. An LAC error is output if the two values differ by more than the maximum volume deviation which is specified in the liquid class.

The LAC feature is only supported by special balance types such as the Mettler WM pooling balance. This balance has a built-in tube rack for 16 x 13 mm tubes and is commonly used for liquid pooling operations. In Freedom EVOware, the LAC feature is configured in the settings for the liquid class.

Liquid class

Set of properties defining a theoretical model for a particular type of liquid. Liquid classes are identified by a generic name (e.g., *Serum*, *Buffer*, *Ethanol*, etc.) and include all liquid handling parameters required to process liquids of that type. The liquid classes can be edited with the Liquid Class Editor.

Liquid distributor

A liquid distributor is a device which is used to distribute liquid. For example, the Liquid Distributor 1-to-4 distributes liquid from a (main) tube to four smaller tubes. The Liquid Distributor 1-to-3, which is used by the Nano-Pipetting System, also contains a valve system to route system liquid between the Fast Wash pump, the Active WashStation and the dilutors/Active Tips according to the function being performed. Note: Active Tips are no longer supported by Freedom EVOware.

Liquid handling parameters

Set of parameters that influence the liquid distribution process (e.g., aspirate and dispense speeds, delays, liquid level detection, tracking, etc.).

Liquid level detection (LLD)

Two different liquid level detection technologies are available for the Freedom EVO pipetting instrument series: capacitive and pressure-based. The capacitive method is always available and the pressure-based method is optional.

Capacitive liquid level detection (cLLD) detects the liquid surface through a change of the electrical capacitance of the pipetting tip when the tip enters or exits the liquid.

Pressure-based liquid level detection (pLLD) detects the liquid surface through a change of pressure in the airgap between the sample and the system liquid when the pipetting tip enters or exits the liquid. pLLD requires the → **Pressure Monitored Pipetting (PMP)** hardware option. PMP is only available for LiHa DITI tips. In contrast to cLLD, pLLD is also suitable for detecting non-conductive liquids.

The LLD settings can be configured individually for each liquid class (liquid type). The liquid class can be configured to use cLLD, pLLD or both systems in parallel.

Liquid system

All instrument modules and parts that contain or directly influence liquid (tubing, dilutors, valves, tips, etc.).

LIMS

Laboratory Information Management System. Also called Laboratory Information System (LIS). Overlying software which is used to control the operations to be carried out in a laboratory and to store the results of the tests or assays, normally in a database.

Loading Interface

The Loading Interface is a hardware option for the pipetting instrument which detects when labware items (typically tube racks) are put onto the worktable (or removed again). It requires special labware which is fitted with a small magnet which activates a proximity switch.

The presence or absence of the labware is reported to Freedom EVOware. In addition, Freedom EVOware can control LEDs fitted to the front edge of each grid position to indicate to the operator that labware should be exchanged and/or should not be exchanged. The Loading Interface is normally controlled by the Sample Oriented EVOware software add-on. Sample Oriented EVOware provides special script commands for specifying which grid positions contain labware which needs to be exchanged and should be monitored by the Loading Interface hardware.

Low volume option

The Low Volume option allows the LiHa to pipette small volumes as low as 0.5 µl with free dispensing, i.e. the tips are not touching the liquid. Even smaller volumes can be dispensed if tip touching is used. The main components of the Low Volume option are the pinch valve, the low volume pipetting tubing, the thinner low volume tips, and the pressure relief valve, which reduces the pressure in the tubing system. Impulses in the pinch valve drive tiny droplets out of the tip. The Low Volume option can only be used with a system liquid of water.

Lower DITI Eject

Hardware option to discard DITIs at a lower height, e.g. to minimize contamination due to aerosols which could arise when the DiTis drop down into the → **DiTi Waste**. This option is required by the Set DiTis Back command.

Magellan

The Magellan software is a Tecan option which is used to control microplate readers (e.g. photometers) and to carry out data analysis using stored procedures. The Magellan software, which has its own installation procedure, has built-in drivers for Tecan microplate readers.

Matrix Assisted Laser Desorption Ionization (MALDI)

Technique in which the sample is in a state where it is evenly mixed with a mass matrix. The matrix absorbs a nitrogen laser and converts it into thermal energy. At the same time, a minute amount of the matrix rapidly heats (within several nanoseconds) and vaporizes with the sample.

MCA (Multi Channel Arm)

The **MCA96** is a special liquid handling arm which is fitted with a 96-tip pipetting head. The pipetting head can be fitted with a tipblock (a replaceable block with 96 tips) or with DITIs. The spacing between the tips is fixed (9 mm). The MCA96 can be optionally fitted with gripper fingers to allow it to pick up and move labware. In contrast to the RoMa, the gripper fingers cannot be rotated (they are always parallel to the X axis of the pipetting instrument).

The MCA96 has important perfomance advantages when pipetting to a large number of wells simultaneously. For mechanical reasons, the same volume is pipetted by all of the tips.

The **MCA384** is a special liquid handling arm which can be fitted with a 96 or 384 fixed tips or disposable tips (DITIs). The spacing between the tips is fixed (9 mm and/or 4.5 mm). So-called head adapters are used to adapt the pipetting head to the different tip types. The MCA384 can be optionally fitted with a gripper system (**CGM**, common gripper module) which can be used to pick up and move labware. The gripper module can be rotated.

Method

In Freedom EVOware, a method is a set of one or more processes to be run together (either sequentially or in parallel). The method file also contains information on the runtime settings. Methods are created and saved in the Runtime Controller. Methods are only supported by Freedom EVOware Plus.

Microplate

Disposable component with standardized dimensions which has a regular arrangement of containers or cavities (wells) for holding liquids or samples. Common microplate types are provided with 96 or 384 wells.

MIO

Monitored Incubator Option. Consists of a heated incubator with optional shaker device.

Movement axes

The various arms with which an instrument can be equipped can move in several axes. The most important axes are listed below. Note that not all arms can move in all of the listed axes.

- X-axis, left/right movement along the worktable front
- Y-axis, front/rear movement
- Z-axis, vertical up/down movement
- R-axis, for rotational movements (e.g. of RoMa gripper head)
- G-axis, for opening/closing grippers (RoMa, PnP)

MPO

Monitored Pump Option (consists of FWO and LICOS). The MPO is used to pump a larger amount of liquid at higher speed through the system, normally to flush the tips. → **SPO.**

MTP

Abbreviation for microtiter plate. → **Microplate**.

Multi Pipetting Option

→ **Te-MO.**

Multi Channel Arm

→ **MCA.**

Multi-pipetting mode

With multi-pipetting mode (also called multi-dispensing mode), a quantity of liquid is aspirated and the liquid is then dispensed in portions into several destination wells. → **Single Pipetting mode**.

Normalization Software

The Normalization Software is an add-on for Freedom EVOware. The Normalization Wizard creates a pipetting script which dilutes samples of varying concentration so that the concentration of each sample is uniform across the destination labware.

The Quantitation Wizard is an option that works in conjunction with Freedom EVOware and the Magellan software to determine the initial concentration of the samples. The Quantitation Wizard can also be used to dilute highly concentrated samples prior to measurement and normalization. The Normalization Wizard imports the concentration data from the Quantitation Wizard or from a data file. The samples are then normalized into a single piece of labware, with all samples having the same concentration.

NPS

Tecan Nanopipetting System. It uses piezo-controlled → **ActiveTips** for dispensing very small quantities of liquid.

Nucleic Acid Testing (NAT)

Method of testing blood that is potentially more sensitive than conventional tests that require the presence of **antibodies** to trigger a positive test result.

Object parameters

In the Process Editor, the bottom half of each process step icon shows the name or names of the labware and/or devices which are involved in the operation. They are called object parameters. The RoMa_MoveObject command has three object parameters:

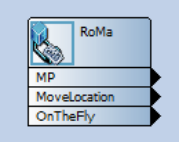


Fig. D-1 *Object parameters of the RoMa_MoveObject command*

See also 9.10.4 “Locations”, 🗎 9-75.

On the fly device

Some devices require the use of the RoMa (plate robot) to carry out their function. A typical example of this is the Symbol LS-1220 barcode scanner which is rigidly fixed to the instrument's deck and cannot move towards the labware to scan it. Instead, the RoMa is used to move the labware past the barcode scanner “on-the-fly” while carrying out something else, for example when moving the labware from one carrier to another. The barcode scanner is then instructed to perform a read operation when the RoMa presents the labware. Such devices are called on-the-fly devices.

PCR Block

Heating block which can be fitted to the Te-MagS or Te-Shake. It is used for → **Polymerase chain reaction** sample preparation.

Pinch valve

Used by the Low Volume option. Allows small quantities of liquid to be dispensed accurately.

Pipetting script

Sequence of pipetting commands. → **Script**

Plate

→ **Labware**, → **Microplate**.

Plate robot

→ **RoMa**

Plunger

The piston in a → **Syringe** or a channel of a → **Multichannel pipetting head**. It aspirates liquid by moving in one direction and dispenses it when moving in the opposite direction.

PMP (Pressure Monitored Pipetting)

Pressure Monitored Pipetting is a hardware option for the liquid handling arm that monitors the pressure in the airgap between the sample and the system liquid during aspiration and dispensing. The pressure curves are used to detect pipetting errors.

PMP is only available for 200 µl and 1000 µl LiHa DITI tips. It requires a special tip adapter and control electronics. Either four or eight tip positions can be fitted with the PMP option.

In addition, the PMP hardware allows pressure-based pipetting error detection, clot detection and liquid level detection (pLLD). In contrast to the capacitive liquid level detection (cLLD), pLLD is also suitable for detecting non-conductive liquids. The PMP and LLD settings can be configured individually for each liquid class (liquid type). The liquid class can be configured to use cLLD, pLLD or both systems in parallel.

PnP (Pick and Place arm) or tube robot

Robot arm equipped with special grippers that can pick up, transport and place small objects within the working area of the pipetting instrument. It is typically used to transport tubes with samples. Current Tecan pipetting instruments can be fitted with up to two PnP arms. Movements of the robot arms between different positions are called vectors.

PnP vector

A predefined sequence of PnP movements which define an action like getting a tube from a tube rack. Also called Tube Robot Vector.

Polymerase Chain Reaction (PCR)

An in vitro technique for rapidly synthesizing large quantities of a given DNA segment. It involves separating the DNA into its two complementary strands and synthesizing two-stranded DNA from each single strand, and repeating the process.

PosID (Positive Identification System)

The PosID (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. Unlike fixed barcode scanners, it does not need a robot to bring the labware to it. The PosID is installed at the rear of the pipetting instrument and is provided with a gripper which pulls the carrier towards the rear for barcode identification

and then slides the carrier back into the pipetting position. The scanning head hinges to read barcodes which are attached to horizontal or vertical surfaces. Barcodes can be read on both the primary side (e.g. sample tube) and the secondary side (e.g. microplates).

The PosID-3 is a new, improved version of the PosID hardware.

Bar codes can also be scanned by the → **Symbol LS-1220**.

PosID-3

The PosID-3 (Positive Identification System) is a movable barcode scanner which can be used to read the barcode labels on carriers, labware and tubes. The PosID-3 supersedes the → **PosID** and has configurable features which allow it to scan a wider range of custom carrier and labware types.

Position

Physical coordinates of the pipetting tip which define a location on the worktable. The position is expressed as X, Y, and Z in mm from the initialization position.

Positioning pin

Objects such as carriers are held in place by a grid of positioning pins (clips). This ensures that they are accurately positioned at discrete positions on the worktable. The positioning pins are spaced 25.0 mm apart in the X direction. → **Grid position**.

Pre-action/Post-action

Pre-actions and post-actions are additional commands which are associated with a device command and are carried out before and after the device command. They are configured with the Freedom EVOware Configuration Tool. Examples are moving labware to a microplate reader and opening the door of a reader (the main function of the reader is to scan the labware). In many cases, Freedom EVOware configures suitable pre-actions and post-actions for you automatically. This applies above all to actions which move objects using the plate robot (RoMa_MoveObject command).

Pre-dilution

Technique in which a liquid (e.g., sample, control) is first diluted with additive or system liquid. Some of the resulting mixture is processed further in a follow-up distribution. The remainder of the mixture is usually discarded.

Process

In Freedom EVOware, a process is a sequence of commands (process steps). Processes are only supported by Freedom EVOware Plus. → **Scheduling**, → **Method**.

Process step

In the Process Editor in Freedom EVOware Plus, a process step is the graphical representation of an operation such as centrifuging a microplate or pipetting to a microplate. Each process step is shown as an icon and is associated with a single device such as a centrifuge, a carousel or the liquid handling arm (LiHa). A process step is the smallest execution unit when scheduling and optimizing a process. In Freedom EVOware Plus, a pipetting script is normally associated with the LiHa Pipette process step. See 13.2 “Overview of Device Commands”, 13-12.

Each process step is associated with a single command (such as Carousel - ReturnPlate). Each command can also have → **Pre-actions** and → **Post-actions**.

PW (Plate washer)

The Tecan 96PW Washer is a fully automated microplate washer for all types of 96-well microplates. The device is fitted with a 96-well wash head, which has one aspirating and one dispensing needle per well. The plate carrier is adjustable to enable the use types of round and flat bottom microplates. The device is also equipped with a mirror so that visual quality control can be performed during the washing procedure. By treating all 96 wells of the microplate simultaneously, the washer is able to achieve very short wash times.

The PW384 is a microplate washer which performs ultra-fast washing of both 384-well and 96-well microplates. The PW384 not only processes all 384 wells simultaneously, but uses “Overflow” washing to further boost wash performance. This wash procedure combines high wash efficiency with short wash times, since no transport steps are required to index the wash head.

The Freedom EVOware plate washer driver is based on Tecan’s → **WinWash Plus** software.

Rack

→ **Labware**, → **Microplate,** → **Strip Rack**, → **Tube Rack**.

Random Access Memory (RAM)

A read-write memory that is used by the software for storing intermediate results. Each memory cell can be addressed individually. Note that the RAM is volatile, i.e. stored information becomes lost when the RAM is not supplied with electricity.

Read-Only Memory (ROM)

Memory chip for non-volatile storage of parameters and/or executable software instructions. Non-volatile means that the data is not lost when the power supply is switched off. The parameters and/or executable software instructions are permanently programmed into the chip during manufacture and cannot be changed later.

Reader

Sample detection or scanning system which uses one or more measurement techniques (e.g. fluorescence, luminescence or absorbance) to analyze the samples. Readers are typically controlled by the Magellan software option using Freedom EVOware’s Magellan driver.

Reference Tip

Alignment tool that can be fixed to a pipetting arm (e.g. LiHa or Te-MO). It is used to exactly adjust the arm in the various axes. Reference tips cannot be used for pipetting.

REMP devices

The REMP company develops and produces devices, consumables, software and fully automated sample processing and storage systems which are mainly used for laboratory applications. REMP is part of the Tecan Group of companies. Freedom EVOware currently provides drivers for the following REMP devices: Portrait Heat Sealer, Reatrix barcode scanner for 96-format REMP tubes and cap/decap device for tubes in a REMP Storage Tube Rack.

Replicates

Replicates are repetitions (copies) of the same liquid(s) at different well positions.

Retract the tips

Retract the tips = raise the tips.

Retract Speed

The retract speed can be critical if you want to pipette liquids with a high viscosity. You must make certain that the tips retract slowly enough to prevent any subsequent droplet formation.

RMP

GENESIS Robot Microplate Processor (pipetting instrument).

Robot only carrier

A robot only carrier is a carrier which can only be accessed by a plate or tube robot and not by the liquid handling arm. It cannot be used for pipetting operations. It is typically a storage device such as a carousel or labware hotel or a device such as a shaker or incubator. The plate or tube robot must be used to move the labware to a “normal” carrier before it can be used for pipetting.

RoMa (Robot Manipulator) or plate robot

Robot arm equipped with special grippers that can pick up, transport and place objects within the working area of the pipetting instrument. It is typically used to transport microplates, reagent blocks, deep well plates, etc. between carriers, incubators and storage positions (e.g. a → **RoMa shelf** or → **Carousel**).

Current Tecan pipetting instruments can be fitted with up to two RoMas. Standard arm versions can handle objects on or above the worktable. Long arm (long z) versions can also access objects which are positioned lower than the worktable, for example the Hettich Centrifuge. Movements of the robot arms between different positions are called vectors.

RoMa versions are available with offset gripper fingers (RoMa eccentric) and symmetrical gripper fingers (RoMa centric). The type to use is chosen according to the accessibility of the object to be gripped. You do not need to (and cannot) specify the RoMa type in the Freedom EVOware configuration. However, you must re-teach the robot movement commands (RoMa vectors) if you exchange the robot arm for a different type. The RoMa vectors supplied with Freedom EVOware have been designed for RoMa eccentric.

RoMa vector

A predefined sequence of RoMa movements which define an action like getting labware from a carrier. Also called Plate Robot Vector.

RSP

GENESIS Robot Sample Processor (pipetting instrument).

RWS

GENESIS Robot WorkStation (pipetting instrument).

Safire reader

The Tecan Safire is a multi-functional monochromator-based microplate reader. It provides high performance for the vast majority of today’s microplate applications and research.

Safire provides you with the following measurement techniques:

– Fluorescence Intensity (FI) top/bottom
– Fluorescence Time Resolved (TRF) top/bottom
– Absorbance

– Quick Absorbance Scanning (optional)

Any standard microplates from 6-well to 384-well format can be measured with any of the above measurement techniques. Fluorescence measurement can be made with up to 1536-well microplates (max. labware height 24.5 mm). Switching between measurement techniques and labware formats is fully automated.

Sample

Substance (blood, urine etc.) to be analyzed in a test or experiment.

Sample Oriented EVOware

Sample Oriented EVOware is a software add-on for Freedom EVOware. Conventional pipetting scripts specify which pipetting operations should be carried out on which wells or tubes, regardless of whether the wells or tubes actually contain samples. With Sample Oriented EVOware, the actions of the pipetting script can be controlled by a so-called joblist which contains information on the locations and/or barcodes of the samples in the source labware. The joblist also lets you specify which test or tests should be carried out on each of the samples. It is not necessary to modify the script or process if the number and/or location of the samples changes with each run.

Built-in intelligent algorithms automatically optiimize the movements of the liquid handling arm depending on the location of the samples, provide support for random controls and - if insufficient samples are available for all wells - ensure that reagents are not pipetted to wells which are empty. Support is also provided for laborarory information systems (LIMS).

Sample Tracking

Sample Tracking is a software add-on for Freedom EVOware. It allows you to record sample and labware identities, track samples and labware through pipetting and robotic steps and to store process-related information, raw data and reduced data. In a network (LAN) environment, it can be used to collect and store data from several Freedom EVOware installations. The recorded data is stored centrally in an SQL database. The data can be exported in various formats and can be accessed by third-party software using an API. A web-based reporting tool is also provided.

Scheduling

Parallel execution of a number of process steps (commands). Scheduling is only supported by Freedom EVOware Plus and can increase the throughout of your pipetting instrument dramatically.

Script

A (pipetting) script is a sequence of pipetting commands. A pipetting script is created with the Script Editor. The commands in a script are normally performed in a sequential manner. In Freedom EVOware Plus, each script within the process is given a unique number (the script ID, normally counting from 1). In Freedom EVOware Standard, you can choose the name of the script when you save it.

Sealer

The Tecan Plate Sealer is used to protect stored samples from oxidative degradation and contamination. A heat-sealed plastic film is applied to the labware to facilitate subsequent transport and/or long term storage. The sealing film is resistant to DMSO and shrinkage and is compatible with temperatures down to -70° C. The Plate Sealer is compatible with a wide variety of labware types.

Serial Dilution

Technique in which a fraction of the liquid dispensed into a destination position is re-aspirated and then dispensed together with additive or system liquid into a further destination position. This can be repeated several times if necessary.

Shaker

→ **Te-Shake** (Tecan Orbital Shaker).

Shuttle (Te-Stack) or handler (Carousel)

Sliding carrier which brings labware from the tower or cartridge to the → **Transfer position**, where it can be picked up by the plate robot.

Single-Pipetting mode

With single-pipetting mode (also called single-dispensing mode), a quantity of liquid is aspirated and all of the liquid is dispensed into a single destination well in one step. → **Multi-pipetting mode**.

Site

Position on a carrier which can hold an object such as labware. For example a *Microplate 3 pos. landscape* carrier can hold three *384 well landscape* plates.

Source Labware

Labware holding container(s) out of which liquid is aspirated.

SPE

Solid Phase Extraction (sample preparation technique). The Tecan vacuum filtration option is based on this method. → **Te-VacS**.

Spectra reader

Tecan microplate reader which can perform both single-wavelength and dual-wavelength measurements. Dual-wavelength has the advantage that it eliminates any influence on the results due to either the microplate itself or due to non-specific absorbance of samples, finger prints, scratches, dust etc. on the microplate. It can store up to 20 programmable tests in its internal memory.

SpectraFluor reader

A fully automatic, computer controlled fluorometer for measuring samples in a microplate. It fulfills the requirements for numerous fluorescence and absorbance applications in research and routine investigations. The filters are arranged in filter slides which allow up to four excitation filters and four emission filters.

SPO

Sensored Pump Option (includes FWO). The SPO is used to pump a larger amount of liquid at higher speed through the system, normally to flush the tips. The SPO supersedes the → **MPO** and has improved liquid level sensors for the waste and system liquid containers.

Stacker

Stackers are used to store a stack of labware and to present them to the instrument for pipetting operations. The labware can then be returned to the stacker for subsequent actions. Tecan pipetting instruments support several types of stacker, e.g. the Te-MO stacker (which is installed above the Te-MO 3/5) and the Stand-alone stacker (which is attached to the side of the instrument alongside the worktable).

Stand-alone stacker option

Stackers are used to store a stack of labware and to present them to the instrument for pipetting operations. The labware can then be returned to the stacker for subsequent actions. The Stand-alone stacker (or Te-Stack) is attached to the side of the instrument alongside the worktable.

Standard

Liquid containing a defined concentration of the substance to be tested. It is used to create a standard curve allowing the concentration of the analyte in the samples to be determined. The properties of the standard are well known and stable.

Standard tip

A Tecan “Standard Tip” is a special type of → **Fixed tip** that has predefined characteristics. There are various models of standard tips (with/without coating, various volumes).

Strip Rack

A rack which holds a single row of sample tubes (i.e. it has a single column of wells). → **Tube Rack.**

Structured Query Language (SQL)

A standard language used to communicate with databases to perform tasks such as update data on a database, or to retrieve data from a database.

Submerged dispensing

Dispensing liquid where the tip is submerged in the liquid. The opposite of submerged dispensing is → **Free air dispensing**. Submerged dispensing is sometimes called contact or surface dispensing.

Sunrise reader

Fully automatic, microprocessor controlled reader designed for professional use, enabling the user to measure the light absorbency (optical density) of samples in 96-well microplates. By reading twelve wells simultaneously, the instrument is able to measure a microplate in approximately six seconds. With an innovative range of options, this versatile MTP reader provides a wide range of features for numerous applications.

Symbol LS-1220

Fixed barcode scanner option which requires a RoMa or PnP to bring the plates or tubes to the scanner. Barcodes can also be scanned by the → **PosID**.

Syringe

Part of the → **Dilutor**. A glass cylinder with a motor-driven → **Plunger** that aspirates/dispenses the required quantity of liquid.

System liquid

Liquid (e.g. water) that fills the liquid system of the pipetting instrument.The use of a system liquid (and the absence of air bubbles) is important for pipetting accuracy. The system liquid can also be used as a washing fluid and/or can be added to selected samples, analogously to an additive. The system liquids option for the pipetting instrument (formerly called the ChemSystem option) allows you to switch between up to 6 different system liquids.

TCP/IP

TCP/IP stands for stands for Transmission Control Protocol/Internet Protocol. It is a collection of protocols, or rules, that govern the way in which data travels from one computer to another across networks. The Internet is based on TCP/IP.

Te-Fill option

The Te-Fill option uses a bi-directional pump instead of the diluter to aspirate and dispense large volumes of liquid, for example buffer solutions. The Te-Fill can be optionally provided with a 6-way valve, which allows you to switch between six different liquid containers. The combination of Te-Fill and 6-way valve is called the Tecan DynamicFill system.

Te-Flow option

The Te-Flow option provides support for the In Situ Hybridization method.

Te-Lidder

Tecan device for removing or replacing lids from plates.

Te-Link

The Te-Link is a transfer rail (conveyor) option that allows the transport of labware such as microplates from one pipetting instrument to another or to another device. Labware to be moved is placed by the RoMa on a shuttle carrier at one end of the Te-Link. It is then moved to the other end of the Te-Link where it can be picked up by another RoMa for further processing.

Te-MagS (Magnetic Bead Separator)

The Te-MagS is a magnetic bead separator with an optional heating function. It uses a commercially-available liquid containing microscopic magnetic beads to rapidly isolate bio-molecules (e.g. DNA, RNA, proteins etc.) or whole cells from various crude mixtures by means of magnetic forces. The magnetic beads are pulled through the liquid in the tubes using magnets and collect the required substance as they move:

Te-MO (Multi-Pipetting Option)

Tecan Multi-Pipetting Option (not to be confused with multi-pipetting mode). The Te-MO is a robot pipetting device which can be mounted on the worktable of the pipetting instrument. It is equipped with a specially designed multi-pipetting head which can pipette to 96 or 384 wells simultaneously, resulting in an extremely high throughput and efficiency. For mechanical reasons, the same volume is pipetted by all of the tips. The Te-MO is available as the Te-MO 3/5 (3 slides, 5 carriers per slide) and the Te-MO 3/3 (3 slides, 3 carriers per slide). The Te-MO 3/5 can be fitted with the → **Te-Stack Te-MO** (Te-MO stacker option). The Te-Stack Te-MO cannot be fitted to the smaller Te-MO 3/3 version.

Te-Poolsafe

Tecan pooling balance. → **Liquid arrival check** and see *Pooling balance* in the index.

Te-PS (Tecan Positioning System)

The Tecan Positioning System is a feature of the Freedom EVO pipetting instrument which allows the alignment of the Liquid Handling Arm (LiHa) to be checked and re-adjusted by the Freedom EVOware software.

Arm alignment, which is only necessary for labware with 1536 wells, is done using the Te-PS Sensor Plate, which is placed on the Te-PS Carrier. The tip alignment process moves each of the pipetting tips past the sensor plate, and lasers are used to accurately measure the position.

Te-Shake

Tecan orbital shaker for microplates or microplate-like containers. The shaker is used for mixing functions and can be equipped with an optional heating plate. The shaker plate is placed on an eccentric. Rotation of the rotor causes an orbital movement of the shaker plate. The orbit of the movement can be varied by changing the eccentric.

Te-Sonic

Device which is used to verify whether tubes contain samples.The Te-Sonic can be equipped with up to four ultrasonic transducers (USTs) that move over one or more rows of tubes to check the presence or absence of samples in them. Each UST can check up to 16 tubes in a tube rack.

Te-Stack (Tecan Microplate Stacker option)

The Te-Stack is used to store a stack of microplates, tube racks or DITI racks and to present them to the instrument for pipetting operations. It fetches the labware from a specified stack and places it onto a moveable carrier where it can be accessed by the liquid handling device or a robot arm. It also lets you put the rack back into the stack. The Te-Stack can be fitted with a barcode scanner which can read barcode labels on plates when they are inserted and removed. The Te-Stack is fitted to the side of the pipetting instrument alongside the worktable.

Te-Stack Te-MO

The Te-Stack Te-MO is used to store a stack of microplates or DITI racks and to present them to the Te-MO for pipetting operations. The microplates can be returned to the stacker for subsequent actions. The Te-MO Stacker is fitted above the Te-MO. It is only available for the Te-MO 3/5 (it cannot be fitted to the smaller Te-MO 3/3 version). Freedom EVOware uses the same driver to control the Te-Stack and the Te-Stack Te-MO. The barcode scanner option is not available for the Te-Stack Te-MO.

Te-Thermix

The Te-Thermix is a modular incubator/cooler system. An incubator is a device which is used to keep labware containing samples or reagents at a defined temperature for a specified length of time, for example until the desired biological or biochemical reaction has taken place.

Te-Thermix modules are available with heating or cooling elements. They are also available with built-in orbital shakers. In addition, some models are are provided with a sliding drawer and are loaded with labware from the front. Other models are loaded from above and do not have a drawer.

Te-VacS

Tecan SPE (Solid Phase Extraction) vacuum filtration system which is used for vacuum separation of biological molecules and chemical compounds.

Te-VacS-P

Tecan SPE Vacuum Separator for the ProTeam Digest workstation.

Teaching block

Alignment tool equipped with four pseudo tips. It is used instead of a → **Tip block** and serves for aligning a 96-channel pipetting head with carriers. A teaching block is also available for teaching the Te-MO 96 Wash Block.

Teaching pin

Pin that can be attached to a 384-channel pipetting head. Used for aligning the head precisely with the carriers.

Teaching plate

Special microplate which is used by Tecan technicians to align the pipetting instrument and adjust the plate robot etc.

Tip

A needle-like device that can be mounted to a pipetting device for aspirating or dispensing liquids. The following tip types are used with Tecan instruments:

→ **Standard tip**

→ **DITI (disposable tip)**

→ **ActiveTip**

→ **Fixed tip**

→ **Tip block** (for multipipetting heads)

Tip block

Set of 96 pipetting tips for use with the → **Te-MO**.

Tip Touching

Tip touching is a special movement when dispensing a liquid. When tip touching is activated, Freedom EVOware dispenses to the destination container in the normal way, but moves the tips to the side of the well and back before retracting them. This helps to remove any drops which may be adhering to the tips. Tip touching is sometimes called touch-off dispensing.

Tracking speed

Refers to the speed at which the tip moves up or down to follow the liquid level during aspiration and dispensing operations.

Transfer position or exchange position

Position to which the Te-MO slide moves to allow the robot arm to fetch or return labware on a specified site. For mechanical reasons, the robot arm cannot access all of the sites unless the slide is moved. → **Active Positioning Carriers** are automatically opened at the transfer position.

For the Te-Stack, Te-Stack Te-MO or carousel, the transfer position is the position which is used by the robot arm for fetching or returning labware. For special applications, the transfer position can also be used for pipetting.

Trough

Special carrier on the worktable or the Te-MO which is used as a container for a reagent liquid. The reagent liquid can be aspirated using the normal pipetting commands. The Te-MO trough is refilled by the Te-MO Wash & Refill Center using the Te-MO Refill Trough command. The worktable trough is refilled manually. Troughs are available with capacities of up to 1000 ml.

Tube

Small round container for holding liquid samples or reagents. Tubes are often marked with a barcode label so that they can be distinguished from one another.

Tube Rack

A rack which holds a collection of sample tubes (typically 8 or 16 per row). A strip rack holds a single row of tubes.

Tube robot

→ **PnP**

Ultra reader

The Tecan Ultra reader is a fully automated software-controlled fluorometer for both normal and polarized fluorescence as well as absorbance measurements. It provides unrivaled performance in luminescence mode.

Ultra Evolution reader

The Tecan Ultra Evolution is a multi-functional microplate reader which provides high performance for the vast majority of today's microplate applications and research. Being sensitive while fast, the Ultra Evolution fulfills the special demands of Ultra High Throughput Screening (UHTS). It provides the following measurement techniques: Fluorescence Intensity (FI), Fluorescence Time Resolved (FTR), Fluorescence Polarization (FP), Fluorescence Lifetime (FL), Absorbance, Luminescence and Dual Color Luminescence (Bioluminescence Resonance Energy Transfer). Measurement results can be optimized for different assay types (cell based or homogeneous), for different microplate types and for different dispensed volumes per well.

Vacuum assisted waste

Option for viscous liquids which creates a partial vacuum in the waste bottle.

Variomag

H+P Variomag. Device from the H+P company consisting of magnetic stirrers for tubes and a thermostatically-controlled heater.

Vector (as in RoMa or PnP vector)

A vector is a sequence of movements of the RoMa or PnP. → **Waypoint**.

Volume Calibration Function

Software function by which the volumes actually pipetted can be calibrated in order to correspond exactly to the intended volume.

Wash

Technique of aspirating system liquid from the system reservoir and dispensing it through the pipetting tips into a wash station in order to clean the tips. → **Waste position**, → **Cleaner position**.

Wash & Refill Center (WRC)

The Wash & Refill Center is a supporting device for the Te-MO which is connected to the Te-MO wash block through tubing. The wash block is a special carrier for the Te-MO which used to clean the Te-MO tips or DITIs and/or for discarding liquid which is no longer needed. The Te-MO 96 and Te-MO 384 have different pipetting heads and use a different wash block design. The Wash & Refill Center is also used to refill the Te-MO reagent troughs.

Wash Block

The wash block is a special carrier for the Te-MO which used to clean the Te-MO tips or DITIs and/or for discarding liquid which is no longer needed. The Te-MO 96 and Te-MO 384 have different pipetting heads and use a different wash block design.

Wash Station

Refers to a special carrier on the worktable which consists of a waste position and one or more cleaner positions. The wash station is used to clean the tips and/or to discard liquid which is no longer needed. → **Waste position**, → **Cleaner position**.

WashStation NPS

→ **Active WashStation**.

Waste position

Part of a wash station above which the tips are positioned to discard liquid which is no longer needed and/or to flush the inside of the tips using the system liquid. The system liquid is dispensed through the tips and then into the cavity of the wash station. The used liquid then flows off through the waste tubing into the waste container.

Waypoint (in RoMa or PnP vectors)

A vector is a sequence of movements of the RoMa or PnP. Each of the intermediate positions is called a waypoint.

Well

One of the containers in a microplate.

WinWash Plus

WinWash Plus is an MS Windows-based program which is supplied with Tecan Plate Washers. It lets you create wash programs and download and upload them to/from the plate washer via the RS232 interface. It also functions as the software interface between Freedom EVOware and the plate washer hardware. Since the WinWash Plus Software uses an OLE Interface, the implementation is transparent to the user.

Worktable

Working surface (or deck) of the pipetting instrument where objects (such as microplates) are placed for access by the liquid handling arm (LiHa) or the plate robot (RoMa).

Worktable Editor

Graphical representation of the pipetting instrument's worktable (deck). It shows icons for the devices which are installed and the arrangement of the carriers and labware.

The gray area in the Worktable Editor represents that part of the worktable which can be accessed by the Liquid Handling Arm. This is called the pipetting area. The real worktable is normally larger than this.

See Fig. 11-8 “Example worktable showing carriers, labware and labware labels”, 11-20.

Worktable, initial

Graphical representation of the initial layout of the pipetting instrument’s working surface (deck). When required by the script or process, Freedom EVOware uses the plate robot (RoMa) to move labware during runtime to new positions (carrier sites). However, carriers and devices always stay at the same position.

XP and XLP dilutor

→ **Dilutor**

X slide

Rail across the top of the pipetting instrument which supports the robot arms (→ **LiHa,** → **MCA**, → **RoMa**, → **PnP**). The robot arms move along the rail to reach all of the X positions on the worktable.

Y-distance of wells

The spacing between adjacent wells in the rack in the Y direction (front to back).

Z-Dispense

Tip height at which liquid is dispensed. It should be low enough to ensure that no liquid drops can get into adjacent wells or tubes. See Fig. 9-13, 9-26.

Z-Max

Tip height which is very slightly above the lowest point of the well, tube or container. It is the lowest position which the tip is allowed to reach without touching the bottom. When searching for the liquid surface, the pipetting instrument will search from Z-Start down to Z-Max. If the tip reaches Z-max without finding liquid, the pipetting instrument reacts according to the configured liquid level detection error mode. See Fig. 9-13, 9-26.

Z-Start

Tip height at which the liquid level detection (ILID) is switched on during pipetting. For tubes and containers (troughs), choose Z-Start to be at least 1 mm below the rim but above the liquid surface. For microplates, choose Z-Start to be at least 1 mm above the edge of the well.

Z-Start should be chosen as low as possible to ensure fast liquid level detection. At the same time, Z-Start must be above the highest possible liquid level in the well/tube to ensure that the liquid surface is found. See Fig. 9-13, 9-26.

Z-Travel

Tip height at which the tips move from one X/Y position to another. Choose Z-Travel to be higher than all obstacles on the carrier. Movements that pass over different pieces of labware use a tip height of Z-Travel (global) instead. See Fig. 9-13, 🗎 9-26.

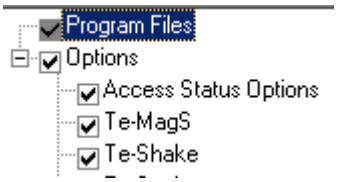
Z-Travel (global)

This parameter is also called Travel Height. When the LiHa moves over a single labware item or between adjacent identical labware items, it retracts all tips to the Z-Travel value which is specified in the labware definition. However, if two consecutive commands cause it to move over different pieces of labware, the tips are retracted to the height you specify with Travel Height in the Configuration Tool (see 8.4.2.1 “LiHa (Liquid Handling Arm)”, 🗎 8-22). This is done to speed up and optimize LiHa movements. Choose this parameter to be higher than all obstacles on the woktable.

ZipTips

ZipTips are disposable tips which are pre-filled with liquid and thus do not need an aspirate command.

D.2 Important GUI features in MS Windows Applications



Checkbox

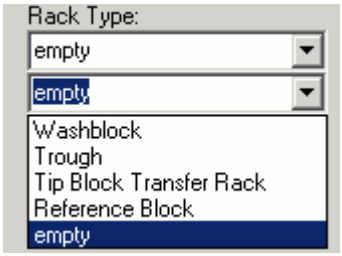
Square box that is selected or cleared to turn on or off an option. It is possible to select zero, one or more options at a time. Selected check boxes are marked with a tick ✓ or a similar check mark.

Combo box

Very similar to the → **Drop down list box**. In principle, a combo box is a text box with an attached list box. Users can either type a valid name in the text box or select an item from the list.

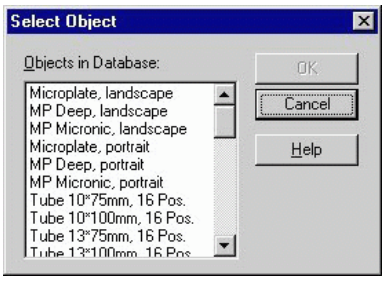
Command button

Button that initiates an action when clicked.



Drop down list box

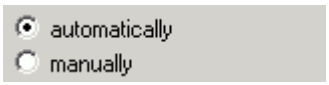
When you click on the arrow on the right side a drop down list appears that lets you select one of the listed items. It is not possible to type a selection in the box as you can do with a → **Combo box**.



List box
A box containing a list of items the user can select. It is not possible to type a selection in a list box.

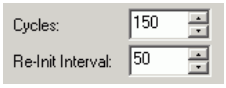
Option button
Round button used to select one of a group of mutually exclusive options. Option buttons are also called → **Radio buttons**.

Progress bar
A control that displays how many per cent of a particular process have been completed so far.



Radio button
See → **Option buttons**.

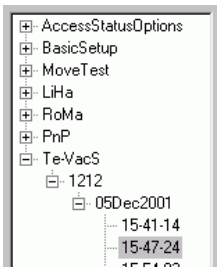
Slider
Indicator that can be moved to display and set a value from a number of values or from a continuous range.



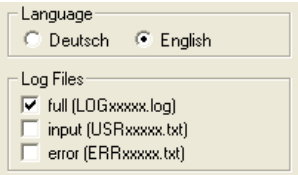
Spin box
Text box with up and down arrows which the user can click to move through a set of fixed values. It is also possible to type a valid value in the box.

Tab
Labeled group of page tops that can be selected to display the related page.

Text box
Rectangular box in which the user can type text or numeric values.



Tree view
Tree view controls are similar to list boxes, except that they display information in a tree-like structure. Tree view controls are especially suitable for representing hierarchical data structures. The small square boxes with a + or - sign in them are called “nodes”. These nodes can be expanded or collapsed to show or hide elements on a lower hierarchical level.



Panel

A panel is part of a dialog box which groups together related items. A panel is normally surrounded by a box.

IX Index

Purpose of This Chapter

This chapter contains an alphabetical index which offers you help in finding information more quickly.

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